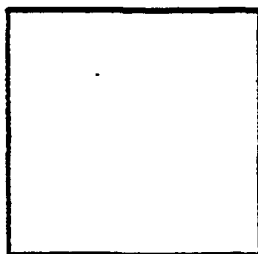


Name: \_\_\_\_\_

Name these quadrilaterals. Use all words one time.



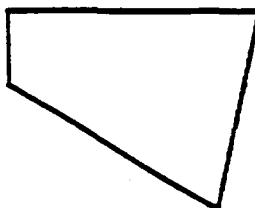
11 \_\_\_\_\_



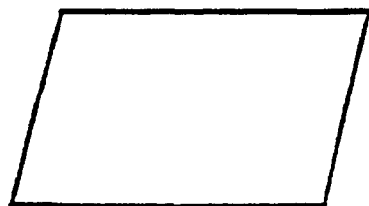
12 \_\_\_\_\_



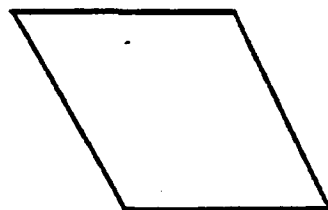
13 \_\_\_\_\_



14 \_\_\_\_\_



15 \_\_\_\_\_



16 \_\_\_\_\_

**WORDS**

RHOMBUS

SQUARE

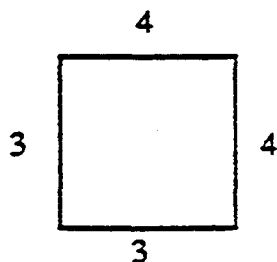
RECTANGLE

PARALLELOGRAM

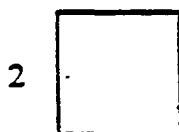
TRAPEZOID

NOT  
PARALLELOGRAM  
AND NOT  
TRAPEZOID

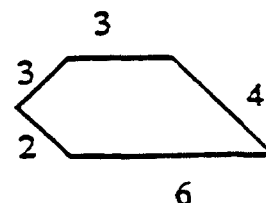
17. Find the perimeter.



\_\_\_\_\_



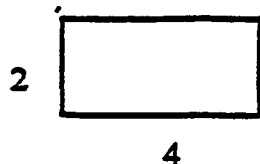
\_\_\_\_\_



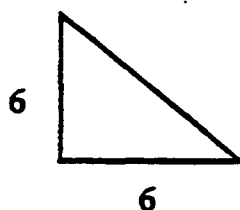
\_\_\_\_\_

Name: \_\_\_\_\_

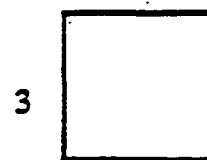
18. Find the area of each one.



\_\_\_\_\_



\_\_\_\_\_

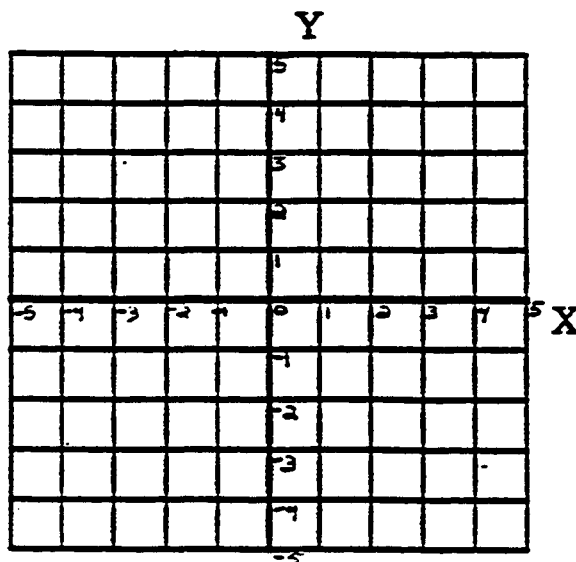


\_\_\_\_\_

19. Use your compass to draw a circle with T at the center. Draw radius  $\overline{AT}$ . Draw diameter  $\overline{XY}$ .

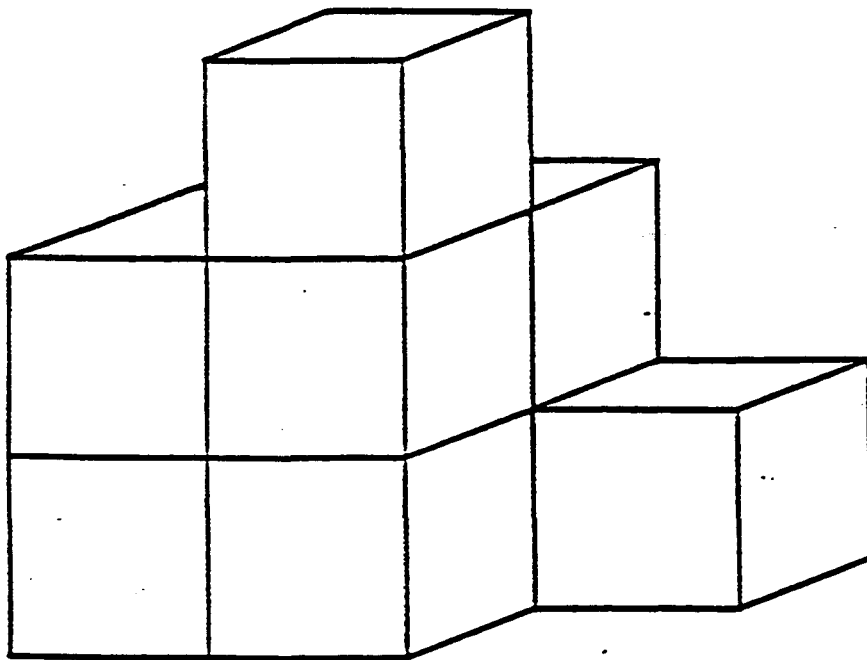
20. Put these points on this plane.

R (2, 3)  
L (-3, -4)  
X (-2, 0)  
Y (-2, 4)  
C (4, -1)



11 Tell what parallel lines are.

12 Build this figure with cubes.





**Data Analysis**  
**Statistics**  
**Probability**



## Data Analysis, Statistics, and Probability Objectives (Draft)

### SOL Link

Obj. 1	Collect, organize, display, and interpret real world data using pictographs.	K.17, 1.18, 1.19, 2.21, 3.22
Obj. 2	Display and interpret data using Venn diagrams.	
Obj. 3	Collect, organize, display, and interpret data using tallies, bar graphs, and multi-bar graphs.	K.16, 2.21, 3.21, 3.22
Obj. 4	Display and interpret data using scatterplots.	
Obj. 5	Collect, organize, display and interpret data using tables, charts and line graphs with scale increments of one or greater than one.	4.19
Obj. 6	Collect, analyze, display, and interpret data using circle graphs. Circle graphs will be limited to halves, fourths, and eighths.	6.18
Obj. 7	Determine and describe the mean, median, and mode as measures of central tendency and determine their meaning for a given set of data. Find the range.	5.18, 6.19
Obj. 8	Construct and display data using a line plot. Collect, organize, display, and interpret a set of numerical data using a stem and leaf plot.	5.17, 6.18
Obj. 9	Use concrete materials (coins, colored counters, spinners, number cubes, etc) to estimate, interpret, and write the probability of a given simple event.	2.23, 4.18
Obj.10	Solve problems by using tree diagrams or by constructing a sample space listing the possible results of a given situation.	3.23, 5.16
Obj.11	Estimate, determine, and interpret the probability of an event occurring from a given sample space and write it as a ratio.	6.20
Obj.12	Solve real life problems by applying the skills of data gathering, computation, and interpretation.	6.18

## Objective I: Collect, organize, display, and interpret real world data using pictographs.

### Vocabulary

statistics  
graph  
pictograph  
data, datum  
more, most  
less, least  
title  
favorite  
often  
key  
symbols  
labels  
represent

### Materials

index cards  
colored pencils, markers, crayons

#### Transparencies:

Letters Mailed Last Week  
Hours Spent Watching Television  
Fish Sales  
Favorite Sports

#### Student Activity Sheet

How Do We Get To School?

### Language Foundation

1. Vocabulary will be introduced as part of the lesson.
2. **Statistics** is the area of math involving the collection, analysis, and display of data. **Data** is information. Data is displayed in a **graph**.
3. Explain to students that there are many kinds of graphs. In this lesson they will be learning about **pictographs**. A pictograph is a graph that uses pictures to show information. Show students the prefix "picto" and explain that this means picture.
4. Explain to students that just as a book needs a **title**, so do graphs. The title of a graph tells what the graph is about just as the title of a book tells what the book is about.
5. If necessary, review the concepts of **more**, **less**, **most**, **least**. Remind students about comparative (two things) and superlative (more than two things.) Explain that most and least always have the word "the" in front of them.
6. The word **data** is always plural. The singular form is **datum**.
7. Students will be learning about the **key** on a graph. Some students might know key as something that opens a door or lock. Explain to them that many words in English have more than one meaning.
8. Tell students that in this lesson **represent** means the same as equal.



## Mathematics Component

### 1. Introduce pictographs.

- Give each student an index card and colored pencils, markers or crayons. Ask each student to draw an ice cream cone on their index card. While students are drawing, set up a graph on the board as diagramed below.

Favorite Ice Cream Flavor

Vanilla							
Chocolate							
Strawberry							

- Give each student a piece of tape and ask them to go up to the board and put their index card in one of the boxes next to their favorite ice cream flavor.
- When all students are done, ask them questions about the graph such as “How many students chose vanilla?”, “How many students chose chocolate?”, “How many students chose strawberry?”, “How many more students chose chocolate than vanilla?”, or “How many more students would have to choose chocolate to equal strawberry?”, “What was the students’ favorite flavor?”
- Explain to students that this is a graph. A graph is a drawing that gives us information. A graph that uses pictures or symbols is called a **pictograph**. The information on a graph is called **data**.
- Tell students that all graphs should have a **title**. Ask students what they think the title of this graph is. Point out the title of the graph. (Favorite Ice Cream Flavor)
- Point to the ice cream cones. Tell students the cones are called **symbols**. All pictographs have symbols. Under the graph draw a cone and write “equals one student.” Tell students this is called the **key**. A key tells what a symbol represents. All pictographs should have a key.
- Point to the flavors - chocolate, vanilla and strawberry. Tell students these words are called the **labels**. All graphs have labels.


### 2. Interpret pictographs.


- Put up Letters Mailed Last Week transparency. Go through the graph asking students to name the title (Letters Mailed Last Week), labels (Monday, Tuesday, Wednesday, Thursday, Friday), and symbol (an envelope).
- Ask students if they can tell you what each envelope represents. (4 letters mailed). Remind them that the key tells you what each symbol or picture represents.

- Ask students how many envelopes they see next to the label Monday. (3) Ask them what each envelope represents. (4 letters) Ask them how they can figure out how many letters were mailed on Monday (multiply 4 times 3 or add  $4 + 4 + 4$ ).
- Now ask students to look at Tuesday. How many envelopes do they see? ( $4\frac{1}{2}$ ) Do they notice something unusual about one of the envelopes? (1 envelope is only half an envelope.) How are they going to count these envelopes? Remind students again that each envelope represents 4 letters mailed. How much would half an envelope represent? (Half of 4 is 2 so the half envelope represents 2 letters mailed.) Lead them through this if they can't figure it out. If necessary draw an envelope. Underneath it draw 4 letters. Cut the envelope in half. Cut the 4 letters in half or 2 groups. How many would be in each group? (2)
- Continue with Wednesday, Thursday and Friday. How many letters were mailed on each of these days? (Wed-18, Thurs-14, Fri-20)
- Which day had the most letters mailed? (Wed and Fri) Which day had the least number of letters mailed? (Thurs)
- Put the Hours Spent Watching Television transparency on the overhead. Ask students what this pictograph is about. (TV Watching) Ask them what the title is. (Hours Spent Watching Television)
- Ask students what the symbol is. (TV set) Ask them what each television set represents. (3 hours a person watches TV) Remind them that the key explains the symbol.
- Ask students what the labels are in this graph. (Adults, teens, children.) Make sure they understand what these words mean.
- Go through the graph with students asking questions such as:
  - Which group watches the most television? (children)
  - How many hours of television did the adults watch? (12)
  - How many hours of television did the teens watch? (15)
  - How many hours of television did the children watch? (18)
  - How many more hours did the children watch than the adults?(6)
  - How many more hours did the teens watch than the adults? (3)
  - Why do you think the children watched the most TV ? (They have the most free time or they're home more than adults and teens.)
  - Pass out How Do We Get to School? Have students answer questions on their own.

### 3. Construct pictographs.

- Put up Fish Sales transparency. Tell students this data will be used to construct pictographs. Ask students what they need to do first. (Answers will vary. ) Tell students a good first step is to decide on a symbol and what it will represent. (A fish would be a logical symbol. ) Discuss different number representations with the students. Why would 1 not be a good choice? (Too many fish and too hard to count.) Why would 2 and 3 not be a good choice? (You cannot divide some of the numbers by 3 and 2 would still be hard to count. )

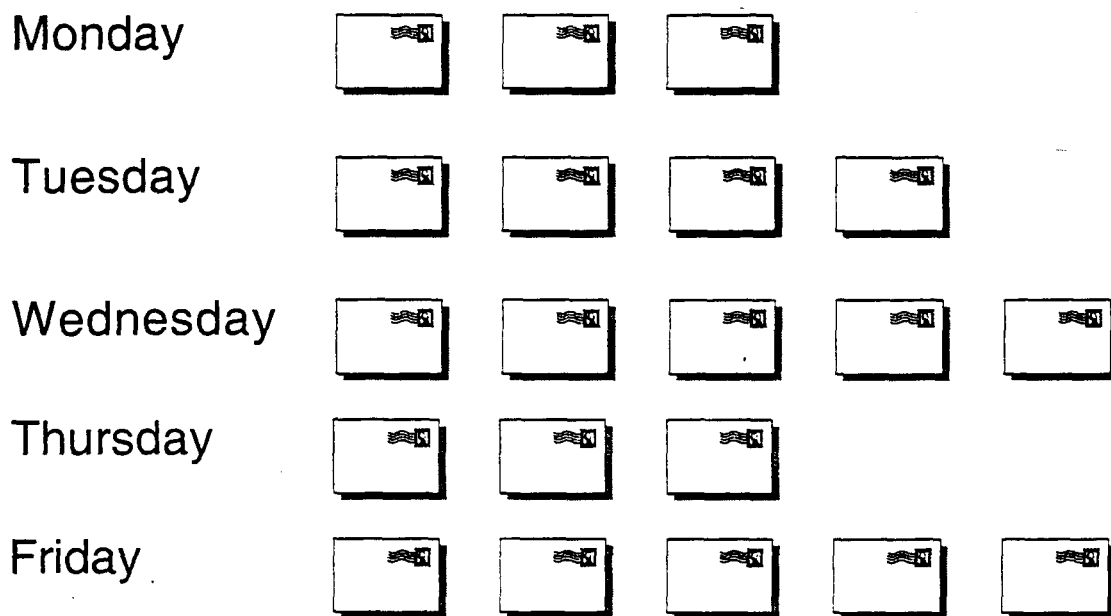
5 or 10 would be the logical choices. 10 is the best choice because it involves the fewest symbols. At the bottom of the transparency write  = 10 fish.

- On their papers, have students list the months. Ask students month by month how many fish symbols they need to draw. (Jan-6, Feb-4, March-8, April 5 1/2, May-3, June 2 1/2) Students may have trouble with April and June. If necessary draw 10 fish on the board. Divide the fish into 2 groups or half and show them that the half fish symbol represents 5 fish.
- Ask students what other things their graph needs besides a symbol. They should say title, labels and key. Ask them what title they could use. (Fish Sales ) What labels could they use? (The labels are the months.) The key should be  = 10 fish.
- Ask students why the key is so important. (You cannot read a graph without a key.) If there was no key, how many fish would we think had been sold in January? (6 instead of 60)
- Tell students they will now construct pictographs on their own. Ask students what the 4 things are that all pictographs need. They should know this by now. (picture or symbol, title, labels, key) If they cannot remember these, put up one of the pictographs in this lesson for them to use as a reference. (Letters Mailed Last Week or Hours Spent Watching Television)
- Put Favorite Sports transparency on the overhead and ask students to construct a pictograph. Ask them what symbol or picture they could use for this graph. (stick person, happy face, etc.) Encourage students to use a person symbol for their pictograph since it is measuring the number of people that like a particular sport.

#### Extension Activity

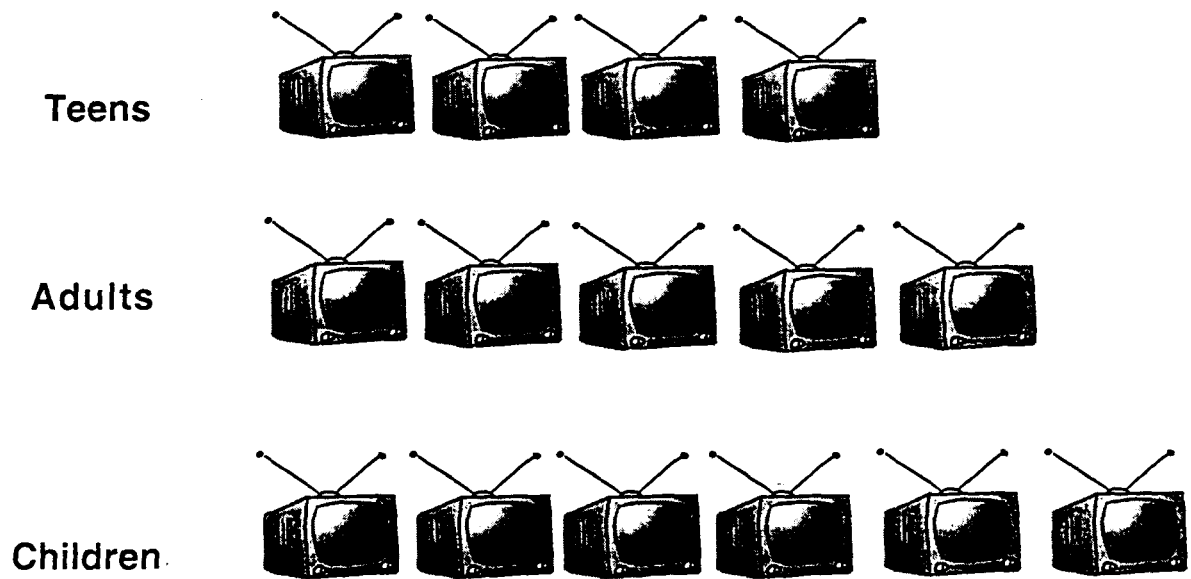
- As an extension activity, students can make up questions to ask their classmates and then put the data into a pictograph. (Examples might include, "What is your favorite school lunch?", "How many people are in your family?", etc.) Students with more language might choose to get data from an almanac, encyclopedia, newspaper or even the Internet.


## Letters Mailed Last Week



Each  means 4 letters.

Hours Spent Watching Television

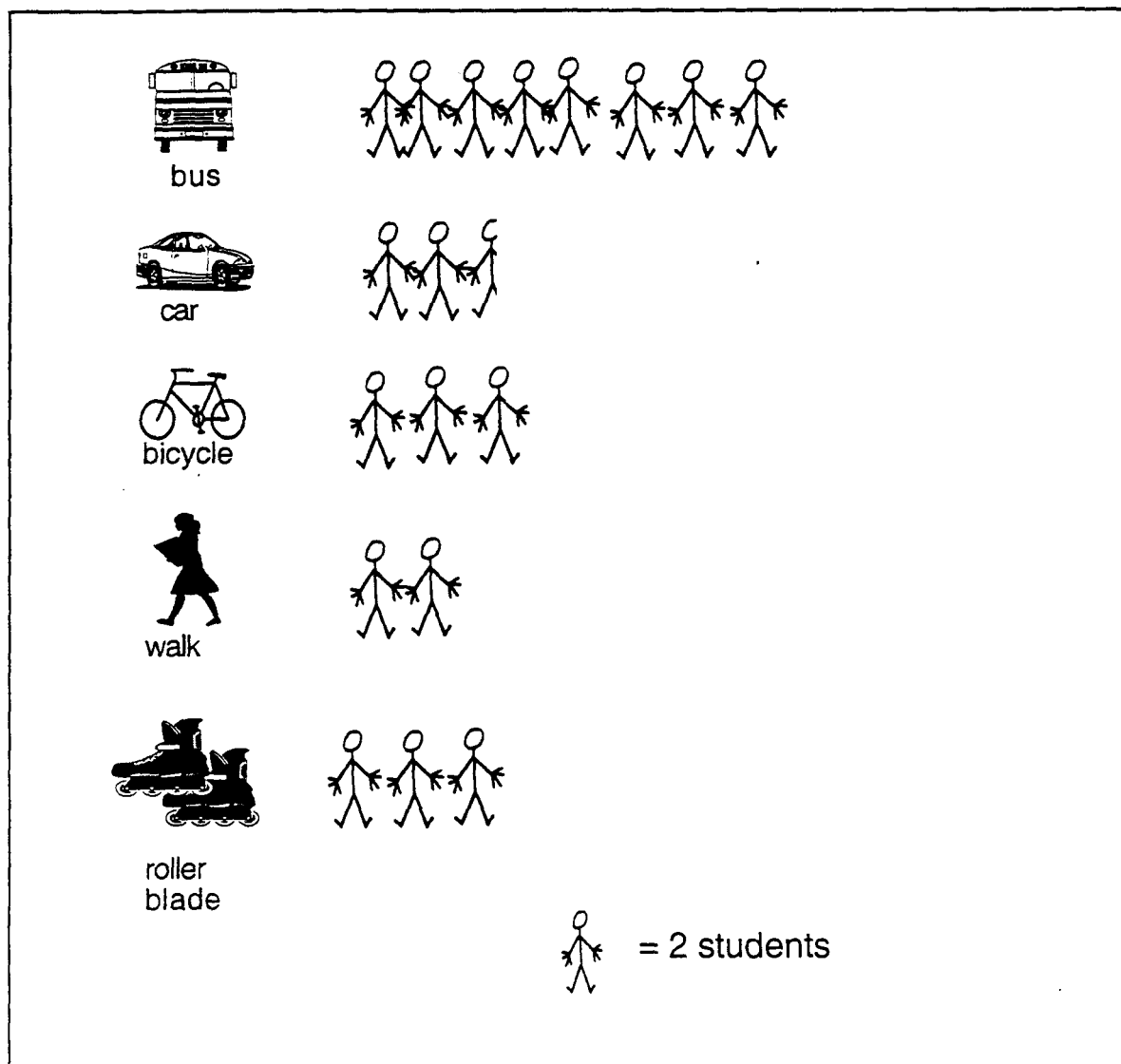


Each  represents 3 hours a person watches TV.

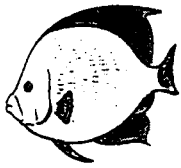
Name \_\_\_\_\_

Students in Mrs. Chan's eighth grade class were asked how they got to school every day.  
Can you answer the questions by looking at the pictograph?

### How Do We Get to School?



1. What is the title of this pictograph? \_\_\_\_\_
2. What does the symbol represent? \_\_\_\_\_
3. How many students are there in Mrs. Chan's class? \_\_\_\_\_
4. How many students ride the bus to school? \_\_\_\_\_
5. How many students ride a bicycle to school? \_\_\_\_\_
6. How many students come to school in a car? \_\_\_\_\_
7. How many students walk to school? \_\_\_\_\_
8. How many students roller blade to school? \_\_\_\_\_
9. How many different ways do students come to school? \_\_\_\_\_
10. How do most students come to school? \_\_\_\_\_
11. Do more students ride a bicycle or walk to school? \_\_\_\_\_
12. Which two ways do the same number of students come to school? \_\_\_\_\_  
\_\_\_\_\_
13. Do more students ride the bus or roller blade to school? \_\_\_\_\_
14. How many more students ride the bus than walk to school? \_\_\_\_\_
15. Do you think this graph would be the same every day? Why? \_\_\_\_\_  
\_\_\_\_\_



## Fish Sales




The supermarket had the following fish sales. Use the data to make a pictograph.

January	60
February	40
March	80
April	55
May	30
June	25

What symbol can you use?

How many fish will each symbol represent?



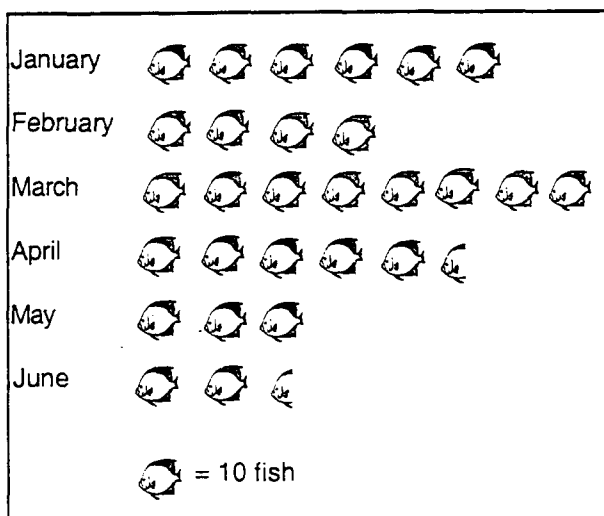
<u>Students' Favorite Sports</u>		<u>Number of Students</u>
	Football	35
	Karate	25
	Soccer	50
	Basketball	20
	Gymnastics	5
	Ice Skating	15
	Baseball	10

## Answer Key Obj. 1

### How Do We Get to School?

- |   |  |
|---|--|
| <ol style="list-style-type: none"> <li>1. How Do We Get to School?</li> <li>2. 2 Students</li> <li>3. 37 Students</li> <li>4. 16 Students</li> <li>5. 6 Students</li> <li>6. 5 Students</li> <li>7. 4 Students</li> <li>8. 6 Students</li> <li>9. 5 different ways</li> </ol> | <ol style="list-style-type: none"> <li>10. Bus</li> <li>11. Ride a Bicycle</li> <li>12. Ride a Bicycle, Roller Blade</li> <li>13. Ride a Bus</li> <li>14. 12 More Students</li> <li>15. (possible answer) No, because the weather might be bad. Some students might not ride their bicycle, walk or roller blade to school. More students would come by car or bus.</li> </ol> |
|---|--|

### Fish Sales



### Students' Favorite Sports (possible answer)





## Objective 2: Display and interpret data using Venn diagrams.

### Vocabulary

Venn Diagram  
diagonal  
multiples

### Language Foundation

1. Review shapes and colors vocabulary. These words in particular will be very important when using the attribute blocks: square, circle, hexagon, triangle, rectangle, red, yellow and blue.
2. Some students may not know what a diagonal line is. This can be drawn on the board and explained beforehand. The word for diagonal is the same in Spanish.

### Materials

yarn or string  
attribute blocks  
colored pencils

Transparencies:

Two Circle Venn Diagram  
What We Own  
Funny People  
Locker/Book Bag  
Three Circle Venn Diagram

Student Copies:

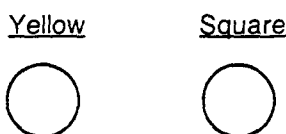
Three Circle Venn Diagram  
Sum It Up!  
Multiples



## Mathematics Component

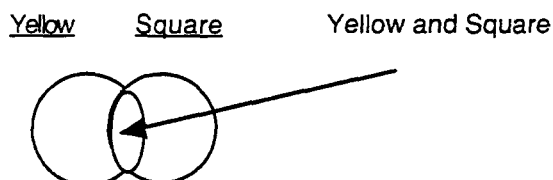
### 1. Introduce Venn Diagrams.

- Make a big circle on the floor with yarn or string. Select several students that have a similar attribute. (wearing blue jeans, sneakers, speak Spanish, etc.) Ask them to stand inside the circle. Then select several students that do not have this attribute and have them stand around the outside of the circle. Ask the class what they notice about the students who are inside the circle. How are they the same? How are the students outside the circle different? Call up the rest of the students one by one and ask them whether they should stand inside the circle or outside the circle.
- Take out your attribute blocks. Draw a circle on the overhead. Take a blue square and a red square and place them inside the circle. Place a blue triangle and red circle outside the circle. Ask students what is the same about the blocks inside the circle. (They are squares.) How are the blocks outside the circle different? (They are not squares.) Write the word Squares above the circle. Have the students come up one by one and place the remaining blocks in the correct spot.
- Draw two circles on the overhead. (The circles should have space between them.) Above the left circle write the word Yellow. Above the right circle write the word Square. Show students the attribute blocks and tell them we are going to put them in the correct circle. (Keep the yellow squares aside for now.)

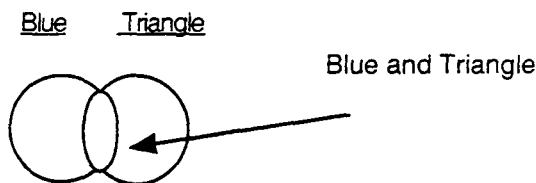


- First point to the Yellow circle and ask students what blocks they think will go in this circle. (Yellow) Next point to the Square circle and ask students what blocks they think will go in that circle. (Squares)
- Show students a yellow circle and ask them where it should go. (In the Yellow circle) Next show students a red square. Ask them where it should go. (In the Square circle) Next show students a red circle. Ask them where they think it should go. Since it does not fit in either of the circles, it goes outside the two circles. Continue in this way showing students one block at a time having them tell you where they should go. When all blocks have been placed, (there will be 28) all the yellow circles, rectangles, hexagons and triangles should be in the Yellow circle, all the red and blue squares should be in the Square circle, and all the red and blue triangles, hexagons, circles and rectangles should be outside the two circles.
- Now take out a yellow square. Ask students where they are going to put it. Ask students, "Can we put this in the Yellow Circle?" (Yes) "Can we put it in the Square Circle?" (Yes) Since the yellow square belongs in both circles, tell students that it has to go in both circles at the same time. In order to do this we have to push the circles together.
- Put up the Two Circle Venn Diagram transparency and show students that this is what the

- Put up the Two Circle Venn Diagram transparency and show students that this is what the circles look like when they are pushed together. Outline the left circle with your finger to show the Yellow circle. Write Yellow above the circle. Outline the right circle with your finger to show the Square circle. Write Square above the circle. Point to the area in the middle of the two circles. Tell students this area is Yellow and Square. Put the yellow squares in the middle. Tell students that when two circles are together like this, it is called a Venn Diagram. It is another kind of graph used to show data.



- Ask students what title could be given to this Venn Diagram. (Yellow and Square, Attribute Blocks, Sorting Blocks, etc.)
- Erase the words Yellow and Square. Above the left circle write the word Blue. Above the right circle write the word Triangle. Above the intersection of the two circles write the words Blue and Triangle. Have students come up one by one and select an attribute block. Ask them to place the block in the correct spot on the Venn Diagram. If they can, have them explain why they are putting the block where they are. Ask the students what title could be given to this Venn Diagram. (Blue and Triangle, Attribute Blocks, Sorting Blocks, etc.) What are the labels? (Blue, Triangle)



## 2. Interpret a Venn Diagram.

- Put up the What We Own transparency. Does this Venn Diagram have a key? (No) Does it have a symbol? (No) Does the Venn Diagram give us information? (Yes)
- Ask students questions about the Venn Diagram.
  - What is the title of this Venn Diagram? (What We Own)
  - What are the labels? (Bicycle, Roller Blades)
  - How many students have bicycles? (10)
  - How many students have roller blades? (8)
  - How many students have a bicycle and roller blades?(6)
  - What are the names of the students who have bicycles and roller blades? (Margaret, Greg, Anita, Marco, Thu, Elena)

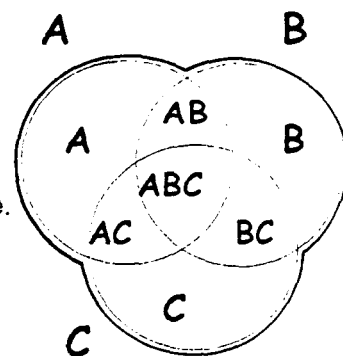
- Put up the Funny People transparency. Ask students to look at the Venn Diagram and tell you the labels for each circle. (This may take some time.) Call on one student for his/her answers. Write them above the circles. Ask students if they agree. Why or why not? Discuss answers as a class. (The left circle has sad faces, the right circle has faces with hats, and the middle section is the sad faces with hats.)

### 3. Construct a Venn Diagram.

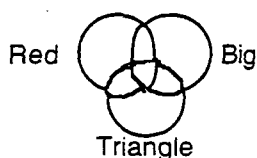
- Tell students they are going to make a class Venn Diagram. Put up the Two Circle Venn Diagram transparency. Ask students what they could use for labels on the circles. Accept any reasonable labels making sure that they will not fit all of the students. For example, ESL would not work well as a label because it fits all of the students and then every student would be in that circle. If all of your students are fourth graders, fourth graders would not work well as a label because again, every student in the class would be in that circle. In addition, you do not want to use labels that would exclude all of one group in your class. For example, boys and girls would not work well as labels because no one would be in the intersection. If students have difficulty coming up with labels, suggest labels such as "Birthdays in the Fall" (or any other season), "Like Vanilla Ice Cream", "Wearing Watches", "Speak Spanish", "Walk to School", etc. Possibilities are endless here. All suggestions could be written on the board and students could then vote on which two labels to use.
- After circle labels have been agreed upon, have students go up to the board one by one and write their name in the correct spot on the Venn Diagram.
- Pass out the Locker/Book Bag student activity sheet. Have students complete it on their own.

### 4. Three Circle Venn Diagrams

- Put up the Three Circle Venn Diagram transparency. Explain to students that this is another kind of Venn Diagram which uses three circles instead of two. Outline Circle A with your finger. Outline Circle B with your finger. Outline Circle C with your finger. Point to section AB and ask students what circles intersect here. (Circles A and B) Point to section AC and ask students what circles intersect here. (Circles A and C) Point to section BC and ask students what circles intersect here. (Circles B and C) Lastly point to section ABC and ask students what circles intersect here. (Circles A, B, and C)



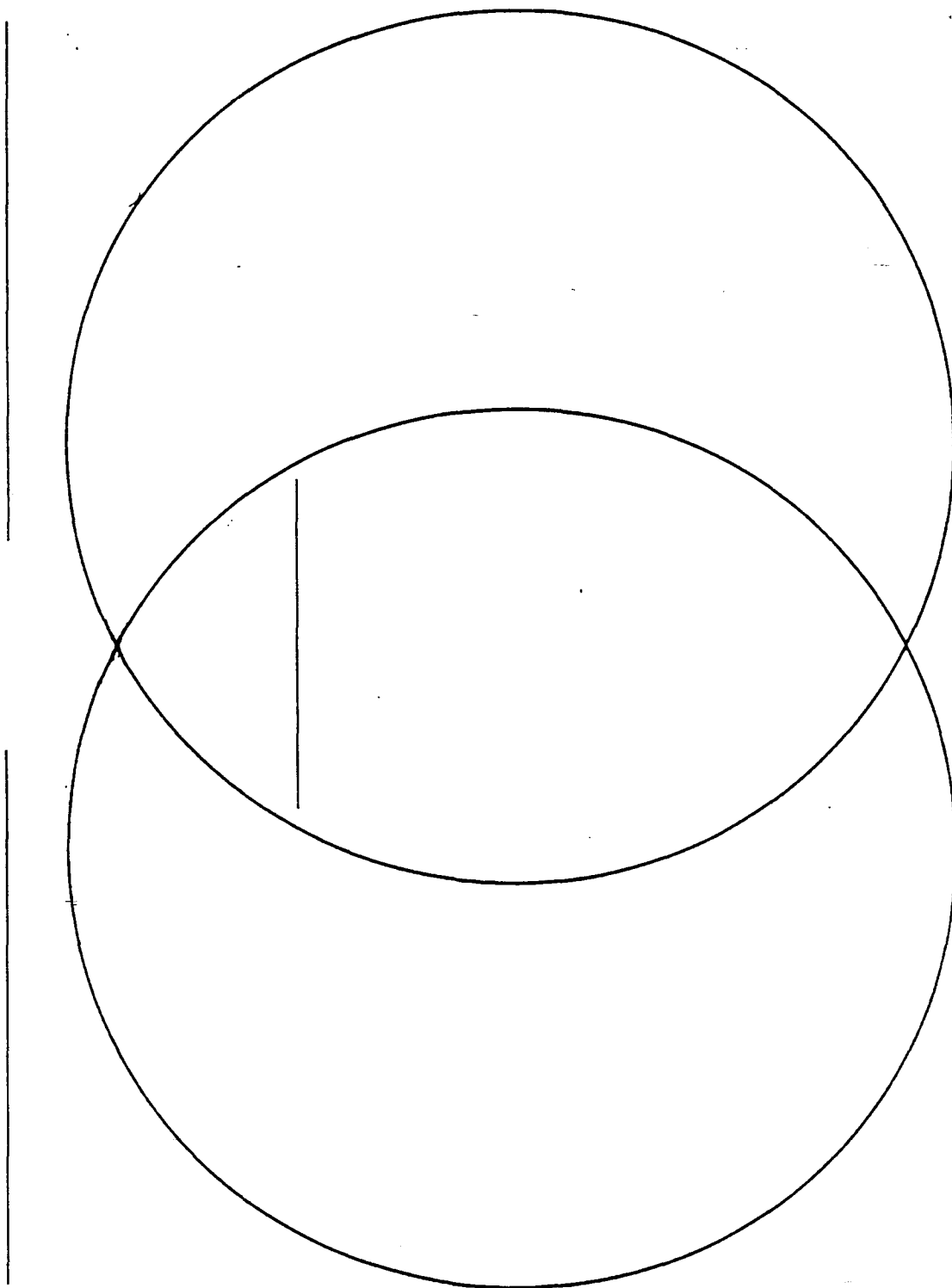
- On transparency write Red above Circle A, Big above Circle B and Triangle below Circle C.



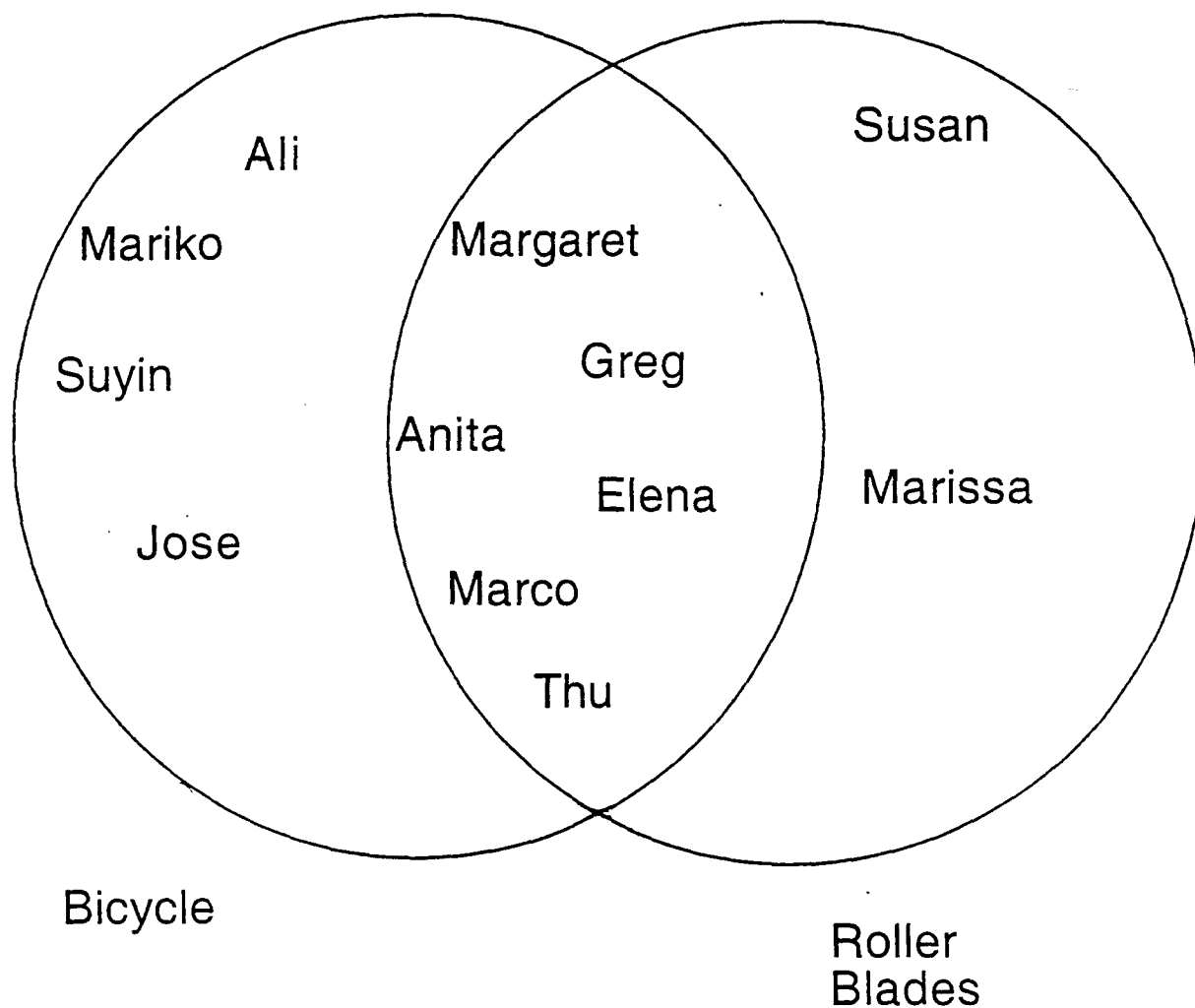
- Take out a big yellow triangle. Ask students where it should go. (Section BC) Have them explain why. (Because it is big and yellow) Next, take out a small blue square. Ask students where it should go. (Outside the Venn diagram) Ask them why. (It has none of the attributes of the three circles.) Take out a big red triangle. Ask students where it should go. (In the middle of the three circles - Section ABC) Continue in this way having students place the blocks in the appropriate spot on the Venn Diagram.
- Pass out Three Circle Venn Diagram student activity sheet.
- Erase Red, Big and Triangle on Venn Diagram transparency. Write in section names, i.e. A, AB, B, BC, C, AC, and ABC. (See diagram on p. 4) Have students lightly color section A blue, Section B green, and Section C red on their student activity sheet. In coloring the overlapping sections (AB, BC, AC and ABC), tell students to use diagonal lines and alternate the colors. (You will have to model this for them.) For example section AB would be blue diagonal, green diagonal, blue diagonal, green diagonal and so on. Section BC would be alternating green and red diagonals, Section AC would be alternating blue and red diagonals and Section ABC would be alternating blue, green, and red diagonals. Tell students to put this sheet in their notebooks for future reference.
- Give students the Sum it Up! student activity sheet. Have them complete on their own. Remind students to look at the Venn Diagram in their binders if they have difficulty.
- Pass out Multiples worksheet. It may be necessary to review the word multiple with the students before beginning. (See Number Concepts Theory, Obj. 10, Vol. 1)
- Go over directions with students. Have them complete the worksheet on their own. (See Answer Sheet for how diagram will look.)
- When students have completed the Multiples student activity sheet, ask them to describe the data. (Do a few examples first as a class.) Write the sentences on the overhead. Examples might include:
  - 3, 6, and 9 are multiples of 3.
  - 4, 8 and 16 are multiples of 4.
  - 12 is a multiple of 3 and 4.
  - 15 is a multiple of 3 and 5.
  - 20 is a multiple of 4 and 5.
  - 7, 10, 11, 13, 14, 17, 18, and 19 are not multiples of 3, 4 or 5.

Have students write a few more sentences on their own.

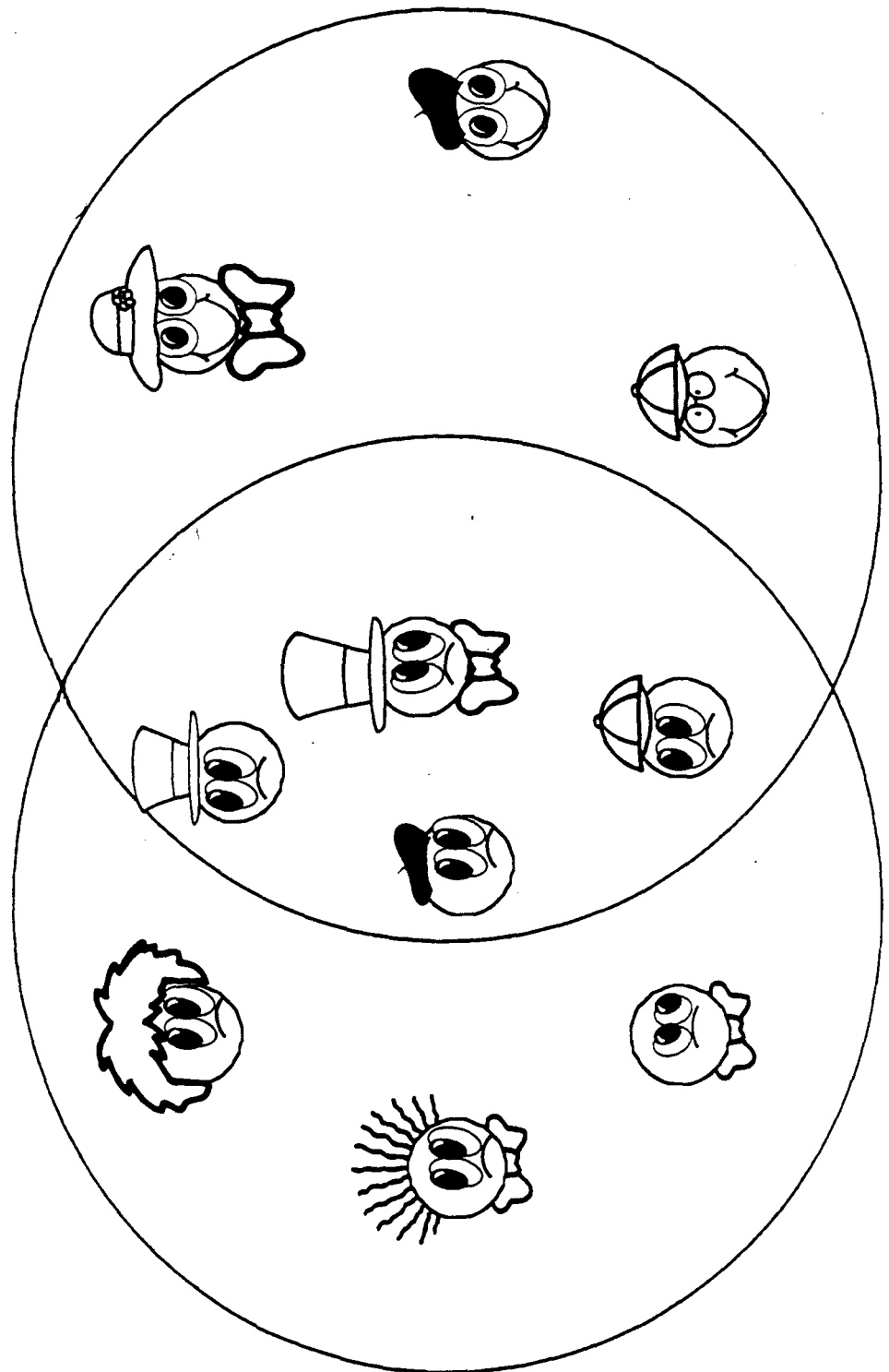




WHAT WE OWN



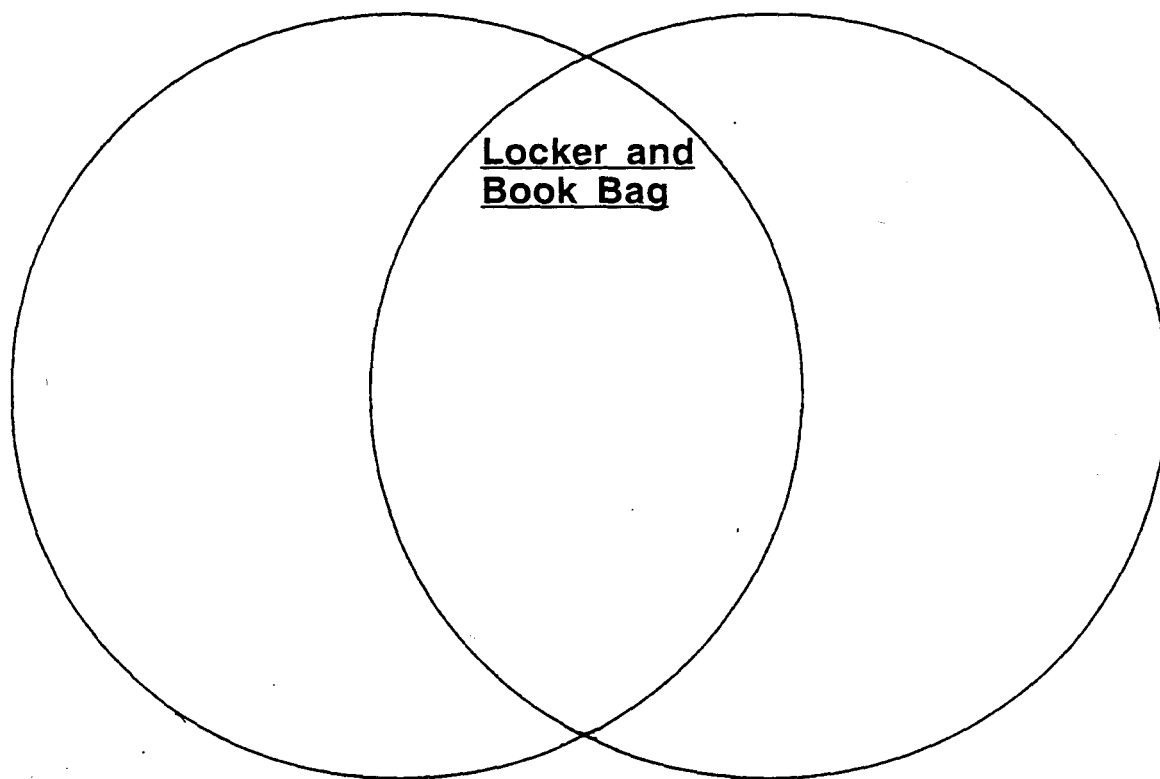
FUNNY PEOPLE



Name \_\_\_\_\_

Locker

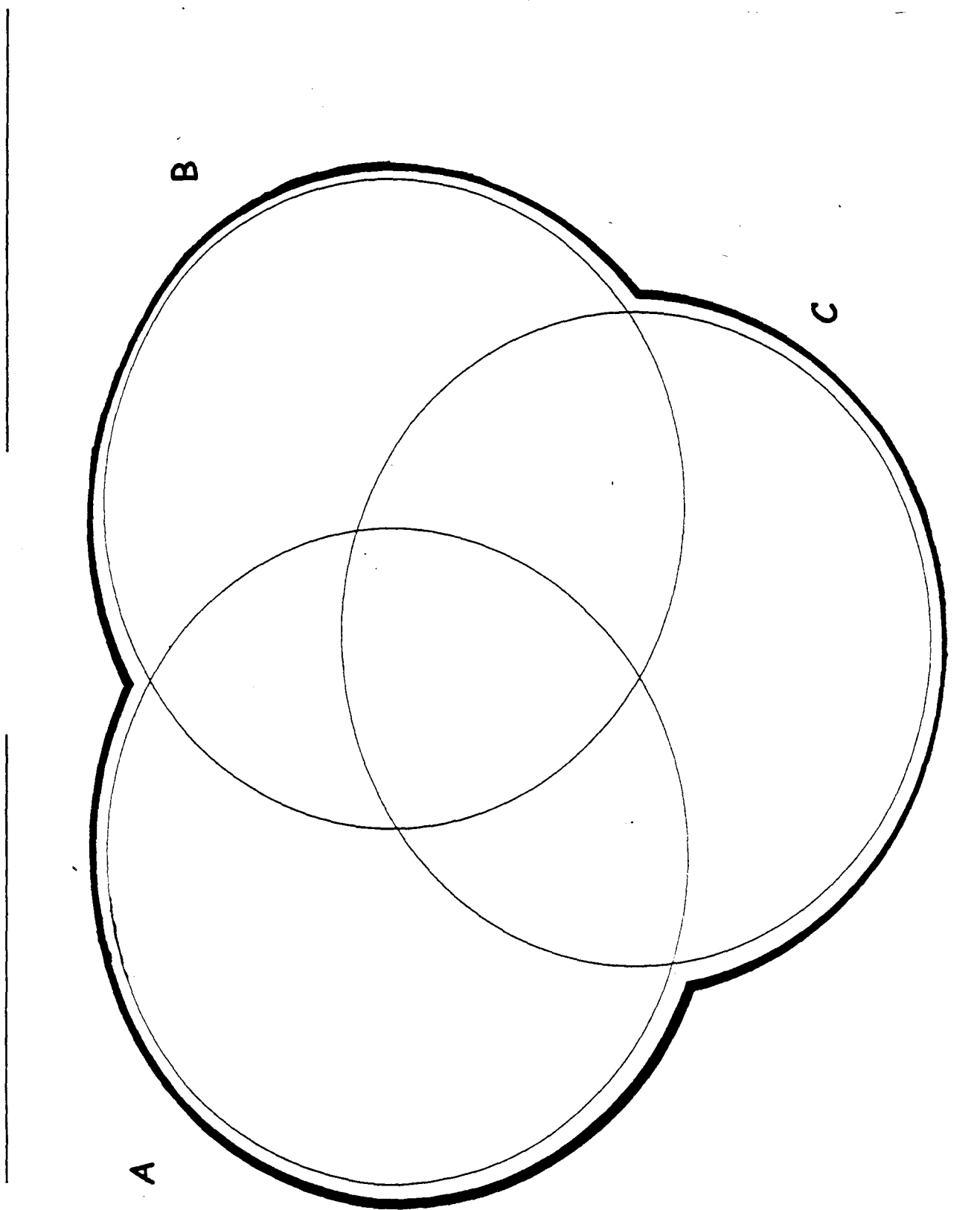
Book Bag



Put the following words in the correct spot on your Venn Diagram.

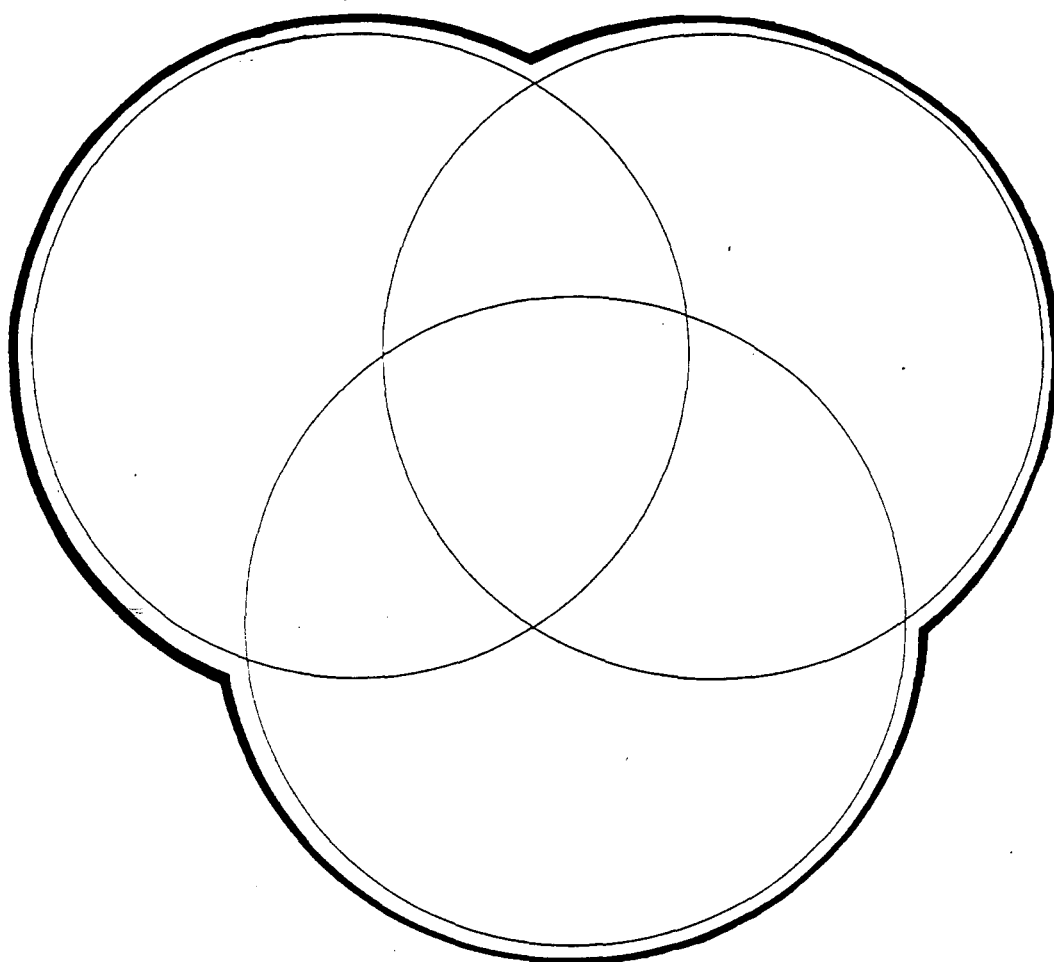
Has a Lock  
Has Chewing Gum In It  
Is Dirty  
Made of Metal  
I Can Carry It  
Has Money In It  
Has Clothes In It  
Has Numbers On It

Has My Name on it  
Is Rectangular ☐  
Goes Home With Me  
Has Books In It  
Has a Zipper  
Is Mine  
Has Pencils In It



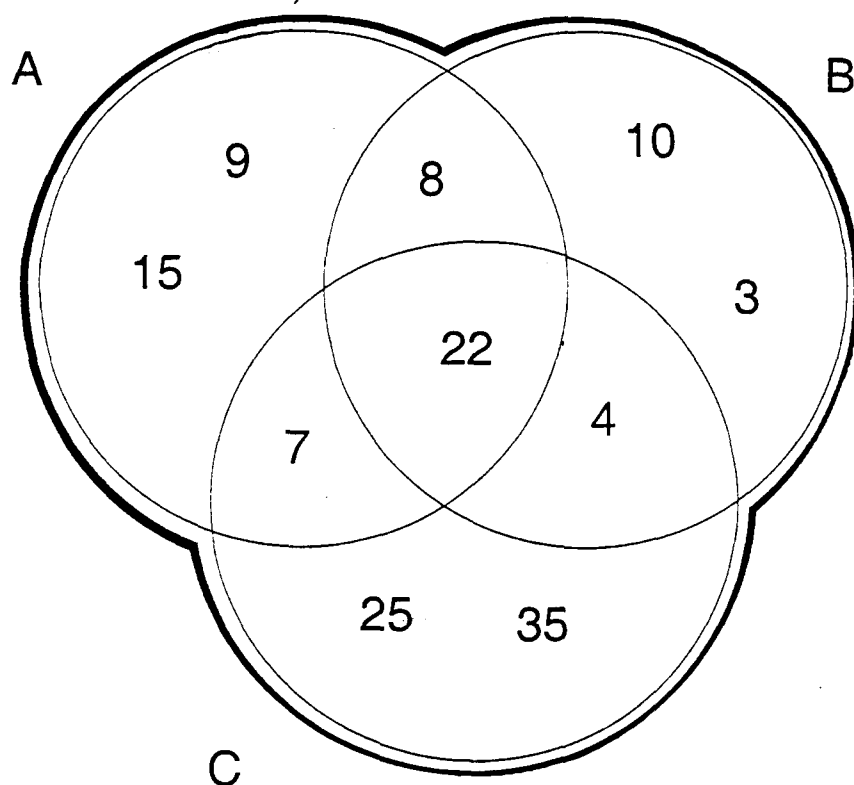
Name \_\_\_\_\_

THREE CIRCLE VENN DIAGRAM



Name \_\_\_\_\_

SUM IT UP!!



Find the sum of the numbers:

1. in circle A \_\_\_\_\_
2. in circle B \_\_\_\_\_
3. in circle C \_\_\_\_\_
4. in both circle A and B \_\_\_\_\_
5. in both circle A and C \_\_\_\_\_
6. in both circle B and C \_\_\_\_\_
7. not in circle B \_\_\_\_\_

Name \_\_\_\_\_

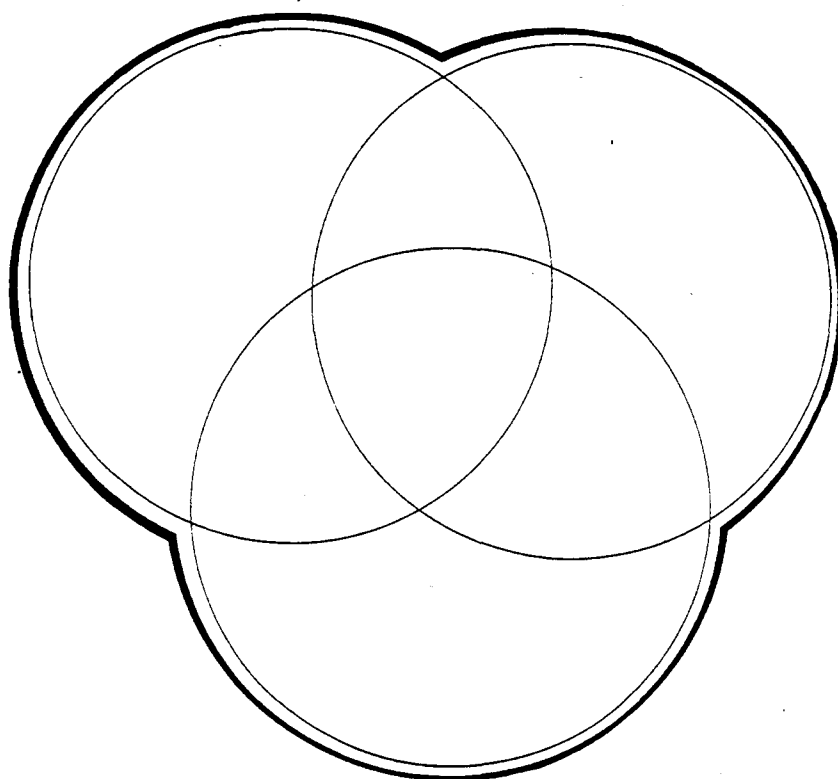
### MULTIPLES

Write the numbers from 3 to 20 on the lines below. Cross each number off as you put it in the correct spot on the Venn Diagram.

3 \_\_\_\_\_ 8 \_\_\_\_\_ 20

Multiples of 3

Multiples of 4

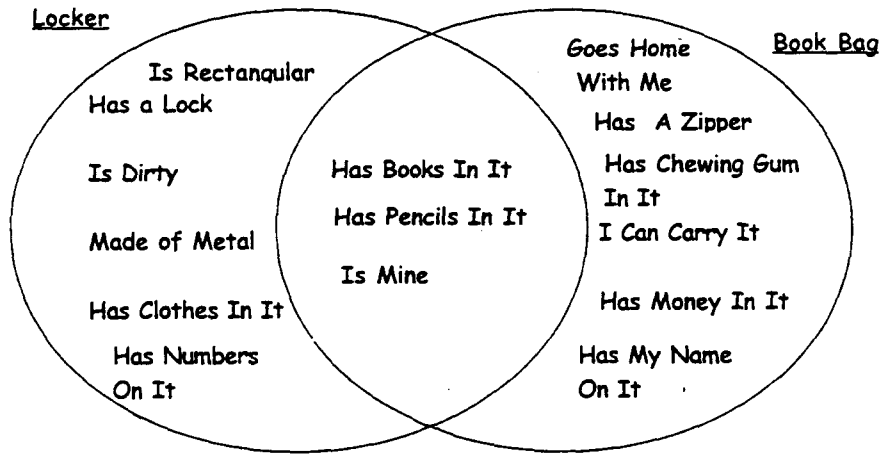


Multiples of 5



# **Answer Key** **Data Analysis/Stat. & Prob. - Obj. 2**

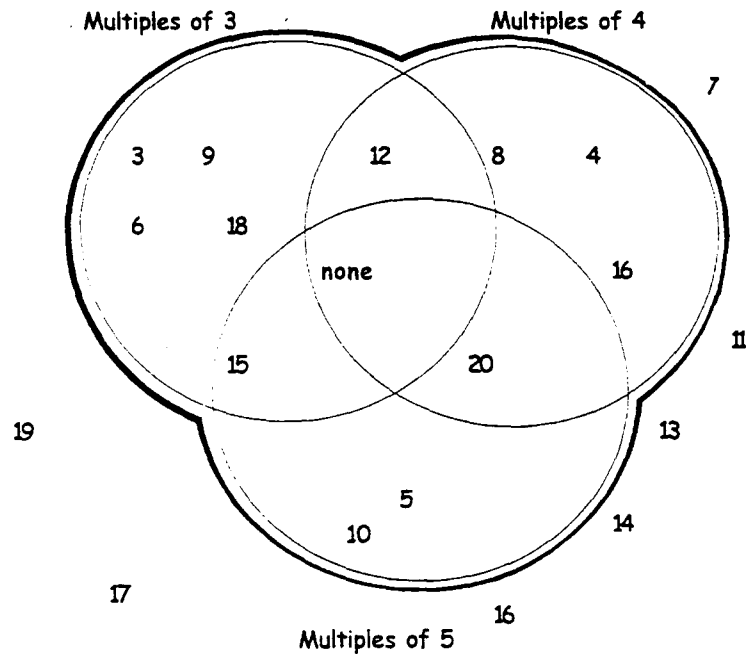
Locker/ Bookbag. Answers will vary.



Sum It I

- 1) 61    2) 47    3) 93    4) 30    5) 29    6) 26    7) 91

**Multiples**



### Objective 3: Collect, organize, display, and interpret data using tallies, bar graphs, and multi-bar graphs.

#### Vocabulary

tally mark  
bar graph  
multi-bar graph  
double bar graph  
axes  
axis  
scale  
interval  
vertical  
horizontal

#### Materials

overhead pens  
markers  
number cubes  
graph paper  
rulers

Transparencies:

After School Activities  
Favorite Subjects  
At The Movies

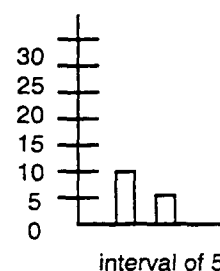
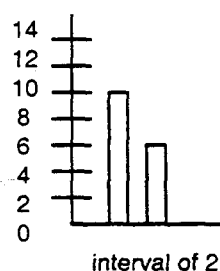
Student Copies:

Pizzas Sold  
Favorite Sports

#### Language Foundation

1. A **tally mark** is a line used to count things.
2. Tell students a bar is used to describe things that are long and narrow. i.e., a candy bar, window bar, space bar (on the computer) or jail bar. Show them pictures of these items. Show them examples of bar graphs. (page 8) Point out the bars. Tell them a **bar graph** uses bars to show and compare information.


3. It may be necessary to review the word **axis** from geometry. (Vol. 2) The singular is axis, the plural is **axes**.
4. Some students may be familiar with a scale as something used to measure weight. Tell students in this lesson they will be learning about a different kind of scale. The numbers along an axis of a graph are called the **scale**.
5. The space between two numbers on a scale is called the **interval**. Tell students an interval is also a space in time. If you have a date book, you can show students intervals in time. If they have student planners, there may also be time intervals on their pages. (Note: When constructing bar graphs, the smaller the interval the taller the graph will be.)



6. Tell students the prefix **multi** means many. Give examples such as multicolored, multivitamin, (bring in a vitamin jar with the word on it), and multilingual. In this lesson students will learn about multi-bar graphs.
7. Once students have mastered the simple reading of a graph, try to ask them questions that will force them to use higher order thinking skills. Questions that ask students to compare and interpret graphs are much more useful in the long run. Encourage students to explain their answers. Students with very limited English may be limited to yes and no answers.

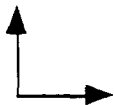
## Mathematics Component

### 1. Introduce Tally Marks.

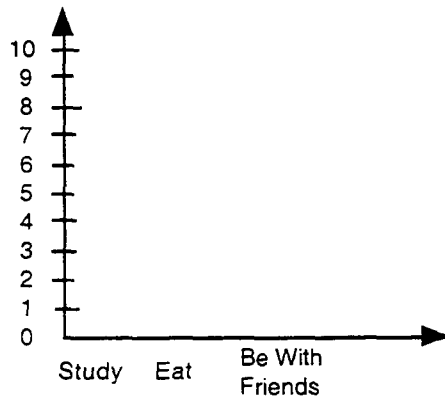
- On the overhead write the numbers from one to six. Give a number cube to a student and ask him/her to toss it and tell you the number. Make a tally mark next to the number. Tell the students this is called a **tally mark** (not a 1). Go around the classroom letting each student throw the number cube until it has been thrown several dozen times (or until one number has at least five tally marks.) Show students that the fifth tally mark is always a diagonal.  Explain that this is because it is easy to count by fives. (You may want to practice this with them.)
- Now tell students **they** will be making the tally marks. Put up the After School Activities transparency with the following choices: Study, Eat, Be with Friends, Watch TV, Listen to Music, Work, or Other. Divide students into two groups (either by age, gender, grade, etc. ) Assign a colored marker to each group, i.e. boys - blue, girls - red, or seventh grade - blue, eighth grade - red, etc. depending on your class mix. Have all the students in one group come up to the overhead one by one and put a tally mark next to the activity they usually do after school. (Make sure the fifth tally marks are diagonals.) When they are done, have the second group come up one by one and make a tally mark. If your class is small, you may want each student to mark more than one activity. (Some activities may have different colored tally marks, some may not.)  
**Note:** The two different colored tally marks will be used later in constructing a multi-bar or double bar graph. For now only the total number of tally marks is important.

### 2. Introduce Bar Graphs.

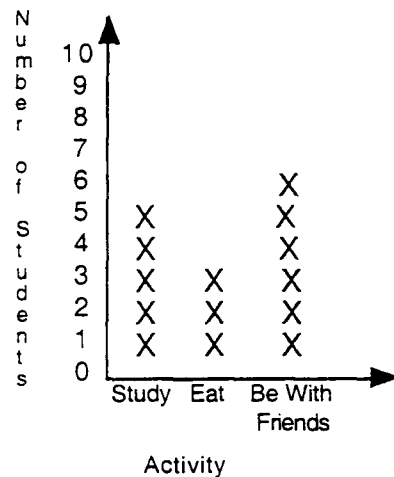
- Count the total number of tally marks next to each activity and write the number. For example if 5 students selected "Eat", write a 5 next to "Eat". Explain to students that they will be using this data to make a new kind of graph called a **bar graph**. Ask students if they remember the name of the first kind of graph they learned about. (pictograph) Explain that a bar graph uses bars instead of pictures to show information. Remind them of the bar graph pictures they were shown.
- Draw a horizontal line on the blackboard. Ask students what kind of line this is. (They should know horizontal by now. ) Next draw a vertical line perpendicular to the horizontal line. Ask students what kind of line this is. (vertical) Tell students these lines are called the **vertical axis** and **horizontal axis**. Together they form the axes of the graph. Put arrows on the ends of the lines. (Have students construct the graph along with you. You may want to give them graph paper.)



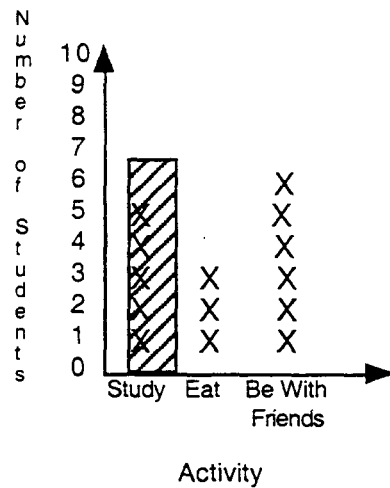
- Write the names of the activities underneath the horizontal axis. (See diagram on the next page.) Ask students what these words are called. (labels) Next write the numbers from 0 to 10 (or higher if needed) on the vertical axis. (Numbers should be equal distance apart.) Tell students these numbers are called the **scale**. Ask them how much the numbers increase by as they go up the scale. (1 ) Tell them 1 is the **interval**.



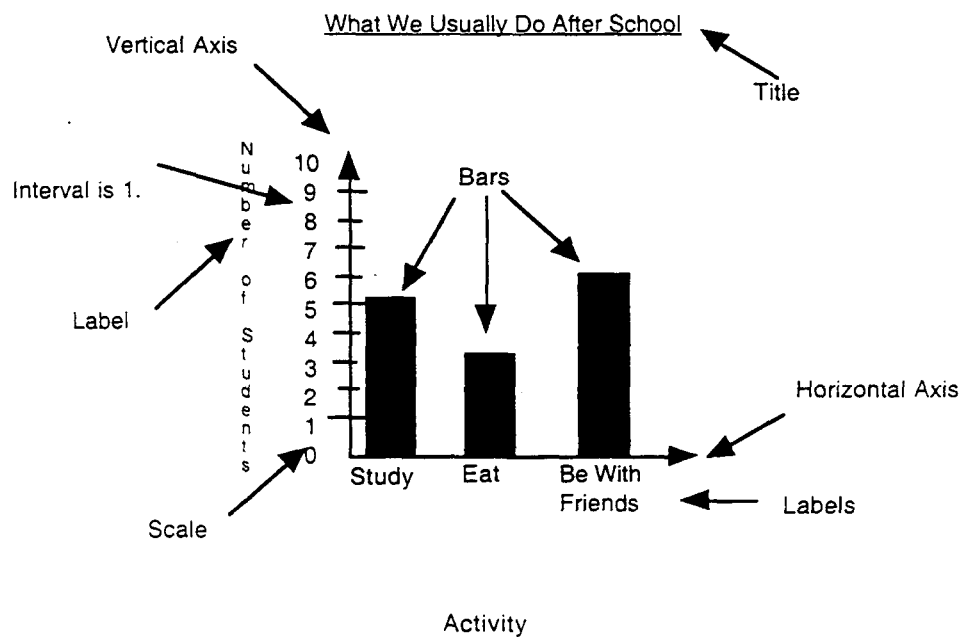
- Label the horizontal axis, Activity and the vertical axis, Number of Students. (See below.) Have students repeat the words horizontal axis, vertical axis, labels, scale, and interval several times while you point to the corresponding item on the graph.
- Look at the first activity, Study. Mark Xs above Study according to how many students selected it. For example if 5 students selected it, put 5 Xs above Study. Make sure the Xs line up with the scale on the vertical axis. Continue with the rest of the activities, marking the Xs above the activity word.



- Draw a rectangle around the first column of Xs. (Make sure the rectangle does not touch the vertical axis.) Shade it in so no Xs show. (See diagram on next page.) Tell students this is called a **bar**. Have students continue drawing and shading until all the Xs are enclosed in rectangles. (The width of the bars is not important, but they should be as uniform as possible and as equidistant from each other as possible.) Ask students questions about the graph such as, "Which activity did students select the most?, Which activity was the least favorite?, How many students chose Be With Friends?, How many students chose Listen to Music?, How many more students chose Watch TV than Study?", etc.



- Lastly, have students label the different parts of the graph. (See diagram below.) Ask students what the graph is missing. (a title) Ask students what title could be given to the graph. (After School Activities or What We Usually Do After School, etc.)
- Have students keep this graph in their binders for reference.



3. Interpret Bar Graphs.

- Pass out the Sales at Domingo Family Pizza activity sheet.
- Ask students what the title of the graph is. (Pizzas Sales) (A brief discussion on how to use the words 'sale,' 'sell,' and 'sold' may be necessary to help the students understand the differences in usage.) Ask students which axis is the vertical axis? (number of pizzas) What information does the horizontal axis give us? (type of pizza) Ask students what the scale begins and ends with. (0 and 50,000) Ask them what the interval is. (5,000) Ask them how much the interval was on the After School Activities bar graph. (1) Ask students why they think the Pizzas Sales graph uses such a large interval. (The numbers are large.) What would happen if the Pizzas Sales graph used the same interval as the After School Activities graph? (The graph would be huge and wouldn't fit on a piece of paper.) If students are having trouble remembering the vocabulary, review with them by pointing to the parts of the graph and have them repeat the terms several times. Have students refer to the labeled graph in their binders for help.
- Have students complete the activity sheet on their own or with a partner.

4. Introduce Horizontal Bar Graphs.

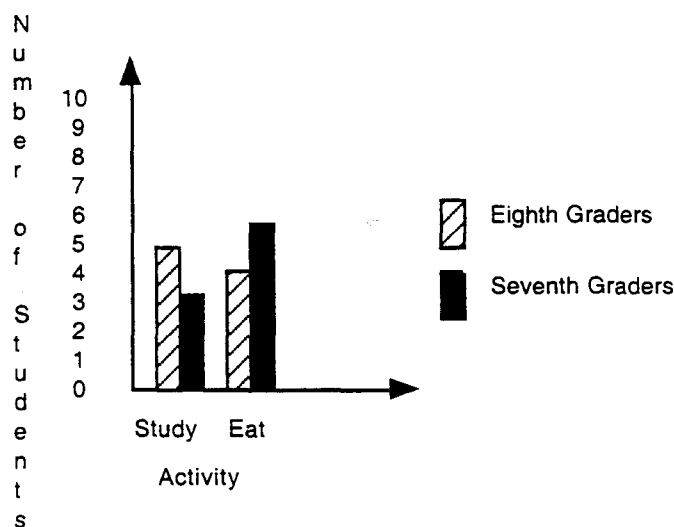
- Put up the Favorite Subjects transparency. Ask students what kind of graph this is. (bar graph) How is it different from the other bar graphs that they have studied? (This graph has horizontal bars, the other graphs had vertical bars.) Tell students this is an example of a **horizontal** bar graph. The other graphs were **vertical** bar graphs. Ask students if they think a horizontal bar graph is better than a vertical bar graph. Does one graph do a better job of showing data than the other? (No)
- Ask students how the vertical axis is labeled. (subjects) How is the horizontal axis labeled? (number of students) What is the interval? (5)
- Ask students questions about the graph such as:
  - Which subject was the favorite? (P.E.)
  - Which subject did students like the least? (History)
  - How many students liked math the best? (15)
  - How many students were asked the question about their favorite subject? (approximately 98)
  - How many students liked P.E. more than science? (5)
  - How many students liked English? (18) (If students have trouble with this question, have them draw little lines and divide the interval between 15 and 20 into 5 spaces.)
- Have students complete the Favorite Sports activity sheet on their own.

5. Introduce Multi-bar Graphs.

- Put up the After School Activities transparency again. Tell students they are going to use this information to make a new kind of bar graph called a **multi-bar** graph. Ask students what the word "multi" means. (many) In this graph they are going to have more than one bar for some of the

activities. Tell them a multi-bar graph is sometimes called a **double bar graph**.

- Draw a horizontal and a vertical axis on the board. Write the numbers on the vertical axis as you did before and the activities under the horizontal axis. Look at the first activity, Study. Count the two groups of different colored tally marks separately so that you have two numbers for this activity. For example, you may have 5 blue tally marks and 3 red tally marks. Write a 5 and a 3 next to Study. (If an activity only has one set of colored tally marks, use a 0 for the other group.) Make sure to keep the numbers in order by group. For example, blue tally marks first and red tally marks second. Go to the next activity, Eat. Count the tally marks for each group and write the two numbers next to the word Eat. Continue in this way until all the tally marks have been counted and recorded for each group.
- Using the same two different colors for each group as the students used to make tally marks, begin drawing the bars for each activity. (Some activities may only have one bar.) For example, if Study was picked by 5 girls and 3 boys (depending on what groups you used), there will be a red bar going up 5 numbers and a blue bar going up 3 numbers. (See diagram below.) The bars for each group should be touching but be separated from the two bars for the next activity.



**Note:** If an activity has a 0 for one of its groups, a bar is not drawn but a space has to be left where the bar would have gone.

- Tell students again that this is called a multi-bar or double bar graph. Point out to them that the bars for each activity touch but are separate from the next activity. Ask them if someone from outside the class would be able to understand this graph. (No) Lead them to see that an outsider would not know what the different bars represented. What could they do to solve this problem? (Make a key.) Remind students about the pictographs they made. Why did they have a key? (to

6. Construct a Multi-Bar Graph.

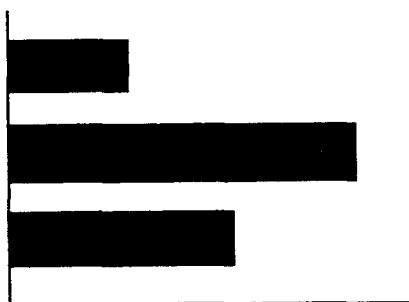
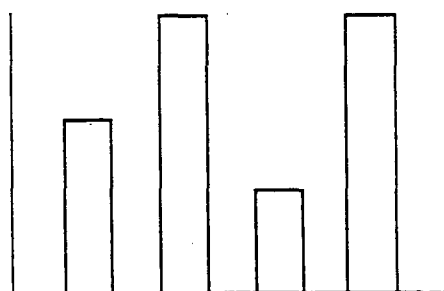
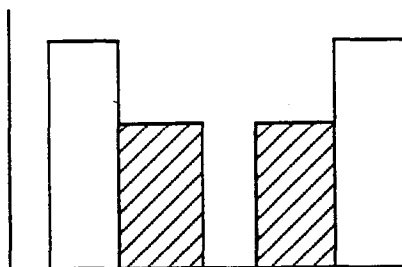
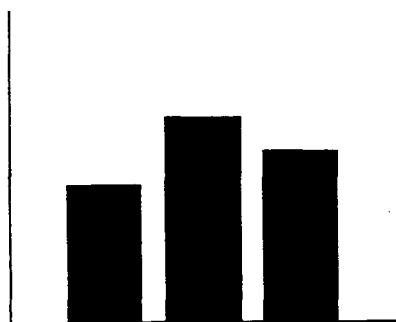
- Put up the At the Movies transparency. Ask students to look at the information. How do they think they could make it into a bar graph? Let them think about it for a few minutes. Ask them how they think they could get started. (Draw two axes.)
- Tell students **they** are now going to construct a multi-bar graph. (Make sure they have graph paper.) Just as before draw a vertical and horizontal axis on the blackboard. Ask students what interval could be used on the scale. (\$50) Tell students they are going to plot each item separately using different colors for each group. (i.e. blue for boys, red for girls) Do the first item with the class. Remind them that in a multi-bar graph, the bars for each item should touch but be separated from the bars for the next item. (See Answer Key.) Make sure they color each bar with the correct color. Ask them what their graph will need. (labels, title, key, scale, interval)

7. Construct a Graph.

- Have students collect data on their own and use it to construct a bar graph (horizontal or vertical) Make sure they give their graph a title. Brainstorm some questions with them that they could ask their fellow classmates. i.e. How do students get to school?, What is your favorite TV show?, What kind of pizza do you like? Students with more language could gather data from the internet, a newspaper or other reference source.



# BAR GRAPH MODELS



## After School Activities

Put a tally mark next to the activity that you usually do after school.

Study



Eat



Be With Friends



Listen to Music



Watch TV



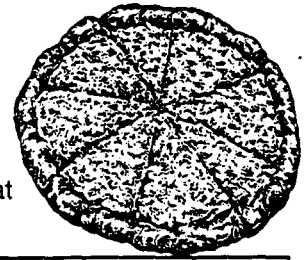
Work



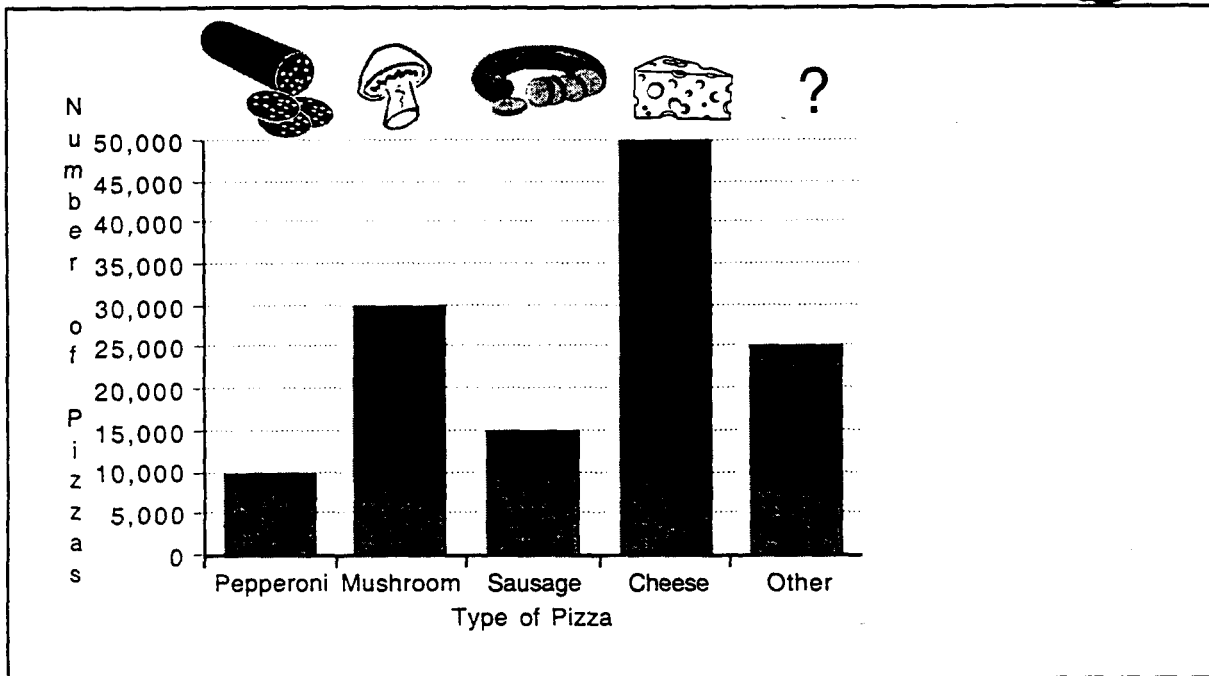
Other

Name \_\_\_\_\_

### Sales by Domingo Family Pizza



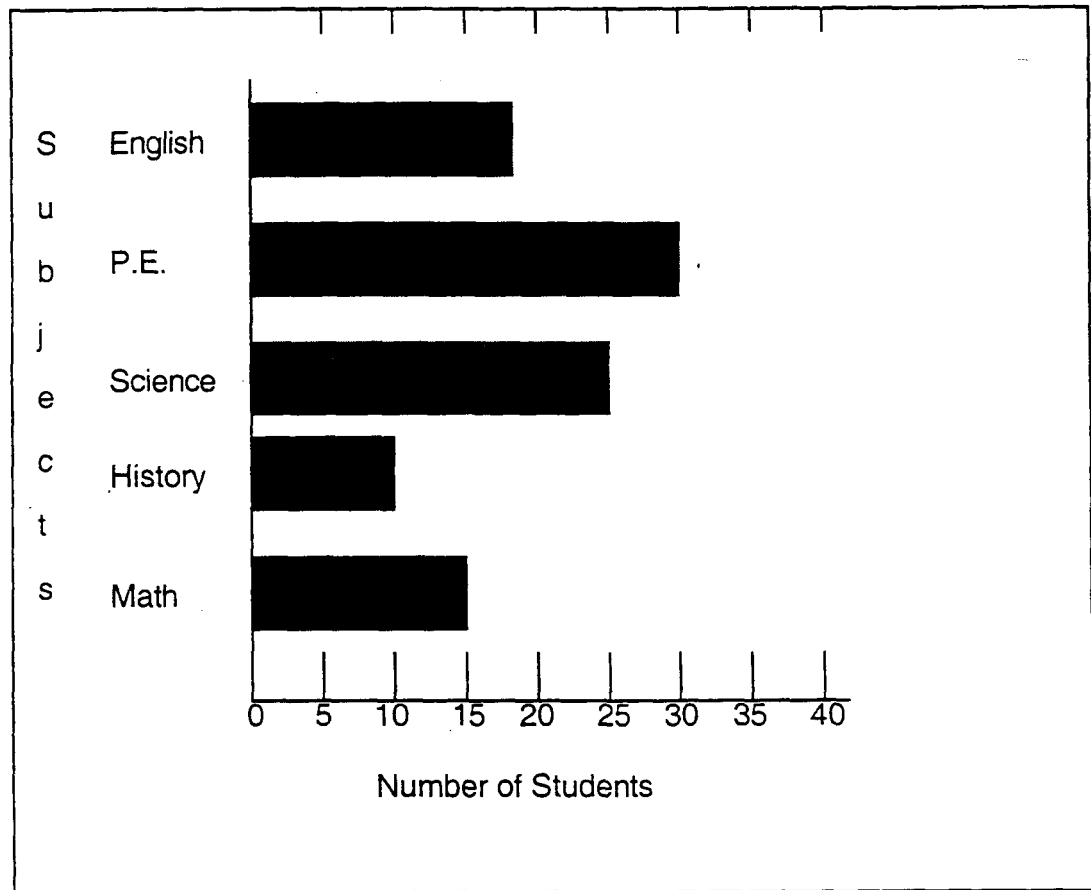
Listed below are the number of pizzas sold in one year by the Domingo family at their three pizza restaurants.



1. Which type of pizza had the most sales? \_\_\_\_\_
2. How many pizzas did the Domingo family sell in all? \_\_\_\_\_
3. How many more sausage pizzas were sold than pepperoni? \_\_\_\_\_
4. The Domingo family sold 30,000 of which type of pizza? \_\_\_\_\_
5. Which type of pizza had the least sales? \_\_\_\_\_
6. How many more cheese pizzas were sold than mushroom? \_\_\_\_\_
7. How many sausage pizzas did they sell? \_\_\_\_\_
8. How many mushroom pizzas did they sell? \_\_\_\_\_
9. What does this graph tell you? \_\_\_\_\_
10. What does "other" mean? \_\_\_\_\_
11. How could the Domingo family use this information? \_\_\_\_\_

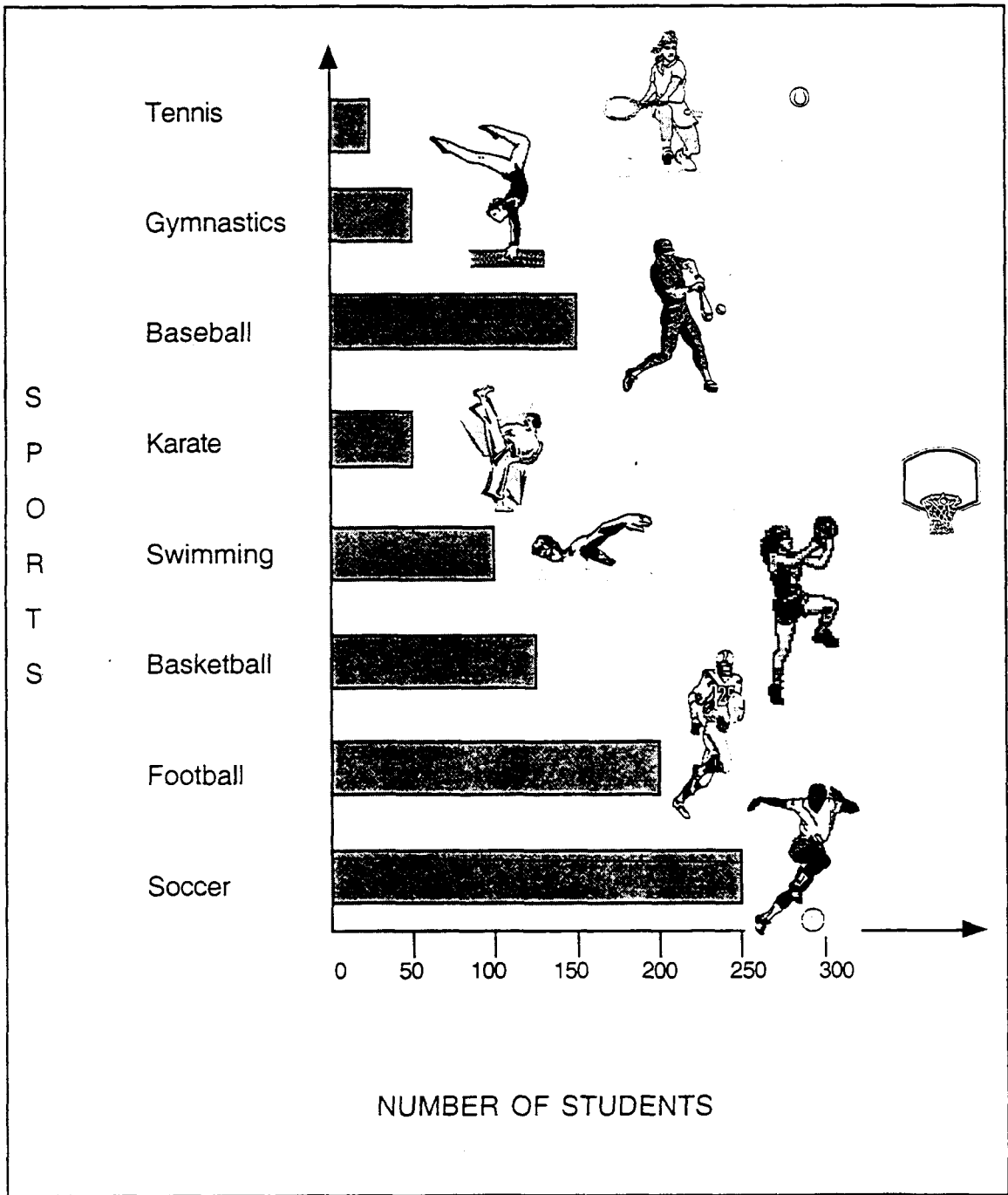
The seventh grade teachers at Mason Middle School asked their students to name their favorite subject. Look at the graph below to see how they answered.

### Favorite Subjects



Name \_\_\_\_\_

### Favorite Sports





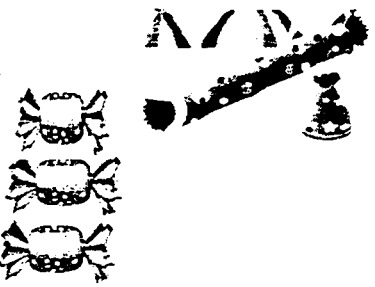


Name \_\_\_\_\_

1. What is the title of this graph? \_\_\_\_\_
2. What kind of graph is this? \_\_\_\_\_
3. Who answered the question for this graph? \_\_\_\_\_
4. What is the interval on this graph? \_\_\_\_\_
5. How many students picked karate? \_\_\_\_\_
6. Which sport was picked by the most students? \_\_\_\_\_
7. Which sport was picked by the least number of students? \_\_\_\_\_
8. Which two sports had the same number of students pick them? \_\_\_\_\_  
\_\_\_\_\_
9. How many students picked soccer? \_\_\_\_\_
10. How many students picked football? \_\_\_\_\_
11. How many more students picked soccer than football? \_\_\_\_\_
12. How many students picked swimming as their favorite sport? \_\_\_\_\_
13. How many students picked gymnastics and karate? \_\_\_\_\_
14. How many more students picked soccer than tennis, gymnastics and karate together? \_\_\_\_\_  
\_\_\_\_\_
15. Did more students pick football and basketball or baseball and swimming? \_\_\_\_\_  
\_\_\_\_\_
16. What were the three sports picked by the most students? \_\_\_\_\_  
\_\_\_\_\_
17. How many students picked baseball as their favorite sport? \_\_\_\_\_
18. How many students picked sports that use a ball? \_\_\_\_\_
19. How many more students picked basketball than tennis? \_\_\_\_\_
20. What were the three sports picked by the least number of students? \_\_\_\_\_  
\_\_\_\_\_

Listed below is the number of snacks boys and girls each purchased during one weekend at the movies. Can you make a graph from this data?

## AT THE MOVIES

		<u>Girls</u>	<u>Boys</u>
Popcorn		250	275
Soda		200	250
Chewing Gum		100	125
Pretzels		325	290
Candy		350	300

## Answer Key Data Analysis/Stat. & Prob. Obj. 3

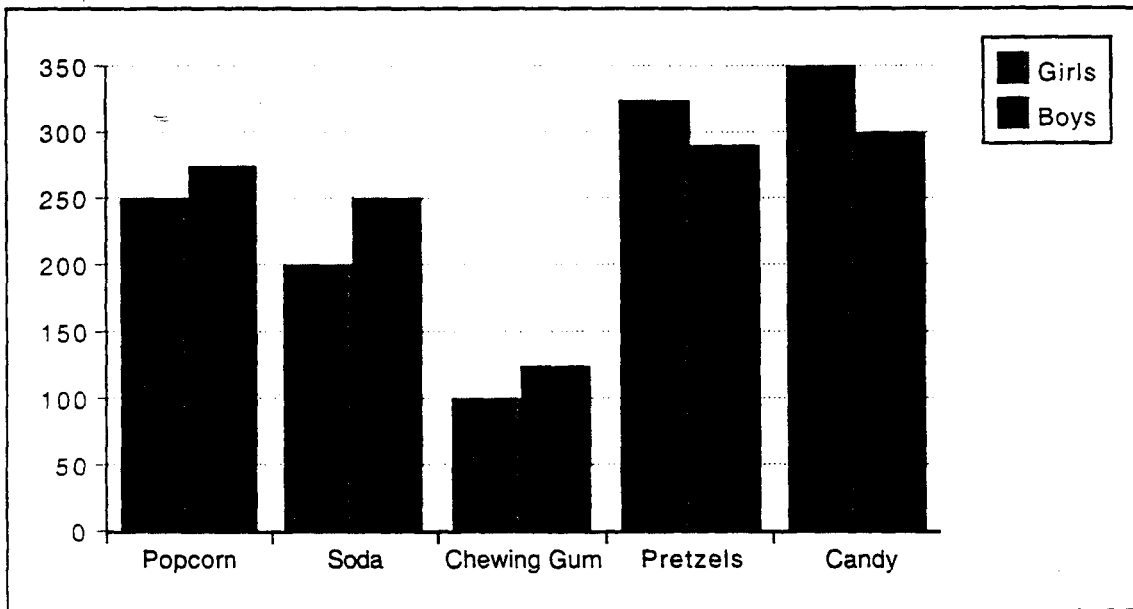
### Pizzas Sold

- |              |  |
|--------------|--|
| 1. cheese    | 8. 30,000  |
| 2. 130,000   | 9. How many pizzas and what kind were sold by the Domingo family   |
| 3. 5,000     | 10. Other kinds of pizza such as green pepper, bacon, tomato, etc. |
| 4. mushroom  | 11. They could use this information for ordering and pricing.      |
| 5. pepperoni |  |
| 6. 20,000    |  |
| 7. 15,000    |  |

### Favorite Sports

- |                          |                                    |
|--------------------------|------------------------------------|
| 1. Favorite Sports       | 11. 50 students                    |
| 2. Horizontal Bar Graph  | 12. 100 students                   |
| 3. Students              | 13. 100 students                   |
| 4. 50                    | 14. 125 students                   |
| 5. 50 students           | 15. football and basketball        |
| 6. soccer                | 16. baseball, football, and soccer |
| 7. tennis                | 17. 150 students                   |
| 8. karate and gymnastics | 18. 750 students                   |
| 9. 250 students          | 19. 100 students                   |
| 10. 200 students         | 20. tennis, gymnastics, and karate |

### AT THE MOVIES







## Objective 4: Display and interpret data using scatterplots.

### Vocabulary

scatter plot or scattergram  
dot(s)  
related

### Materials

graph paper  
rulers

Transparencies:

At the Beach

Theater Ticket Sales

Our Class

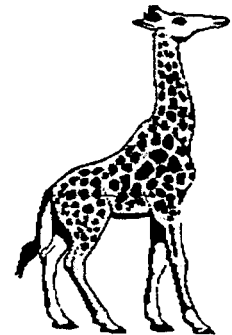
Student Copies:

Do Taller People Wear Bigger Shoes?

How Many Baskets Did Linh Make?

### Language Foundation

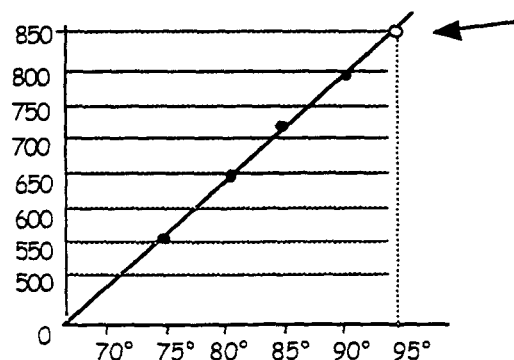
1. To teach students the word **scatter**, take several pieces of paper and throw them around the room. Tell students about feeding birds (scattering bread crumbs) or about clothes scattered around a bedroom. Tell students they will be learning about a kind of graph called a **scatter plot**. **Plot** means to put points on a graph. Remind them about the coordinate graphing they did in geometry.
2. Tell students that on a scatter plot, data is represented by **dots**. Dots are the same as small circles. Some students may be familiar with the word spots such as spots on a giraffe or spots on a ladybug. Tell them dots are round spots. i.e., polka dots.
3. Tell students **related** means to have something in common or the same. We are related to members of our family; for example, our cousins. The cat is related to the lion. In this lesson, they will be learning about related data.



## Mathematics Component

### 1. Introduce scatter plots.

- Put up the At the Beach transparency. Give students a minute or two to study it. Ask students what they think this is. (a graph) How do they know? (It is a drawing that gives us information and it has all the parts of a graph.) Ask students how this graph is different from the others they have studied so far. (It uses **dots**, the others used pictures and bars.) Ask students how it is the same as the other graphs. (It has a title, scale, interval, and labels.)
- Tell students that this kind of graph is called a **scatter plot or scattergram**. Ask them what this graph is about. (Henry's ice cream sales) What information does the vertical axis give us? (sales) What information does the horizontal axis give us? (temperature) What is the interval on the vertical axis? (\$50) Direct students' attention to the first interval on the vertical axis. Ask them what they notice about this interval. (0 to 500) Is it the same as the other intervals? (No) What is different about it? (There is a dotted line and the interval is 500. The other intervals are 50.) Tell students that the dotted line means that this interval is different from the others.
- Ask students what Henry's sales were when the temperature was 75°. (\$550) What were sales when the temperature was 80°? (\$650); 85°? (\$725); 90°? (\$800). What do they notice about the ice cream sales? (They are increasing.) What else is increasing as the ice cream sales are increasing? (the temperature) Ask students why they think the ice cream sales increase as the temperature increases. (As it gets hotter outside, more people want to eat ice cream.)
- Ask students if they can predict what sales will be when the temperature is 95°. (about \$850) Take several responses from the class. To show students how to get the correct answer, draw in 95° on the temperature axis. Draw a vertical line straight up from the 95° mark. Draw in 850 and make a horizontal line across the graph. (See diagram below.) Place an overhead ruler on the transparency and draw a straight line through the dots. Point out to students that the dots form a straight line. The two lines you have drawn will intersect at \$850. Draw a dot there. Ask students what the correct answer is. (\$850)
- Ask students what could happen that might make sales be less than \$850 when the temperature is 95°. (The weather might be rainy that day or people might decide not to go the beach that day.)



- Tell students that when one set of data affects or changes another set of data, the data is said to be **related**. Ask students if this data is related? (yes) Why? (As the temperature goes up, the sales of ice cream go up as well. An increase in one number causes an increase in the other number.) Students will learn later that this is called positive correlation. They do not need to know this now. Point out to students that related data always forms a line.
- Ask students if they can think of other things that might be related. This may be difficult for them. You might want to list various items and have them say whether or not they are related. i.e., height and weight (usually), hours of study and grades (yes), letters in your name and weight (no).
- Put up the Theater Ticket Sales transparency. Ask students what this graph is about? (theater ticket sales) Ask students what information the vertical axis gives us? (number of tickets sold) What information does the horizontal axis give us? (ticket prices) Ask students what they notice about the dots in this scatterplot that is different from the dots in the At The Beach scatterplot. (The dots in this scatterplot are going down, the dots in the At the Beach scatterplot were going up.) (Put up the At the Beach transparency if students do not remember it.) Ask students what they think the Theater Ticket Sales graph is telling us about ticket sales? Lead them by asking what happens to ticket sales as the price of the tickets increases? (The more the ticket costs, the fewer the number of tickets sold.)
- Ask students if they think ticket sales and ticket prices are related. (yes) Remind them that data is related when a change in one makes a change in the other. Ask them if a change in ticket prices makes a change in ticket sales. (yes) In what way? (As ticket prices go up, ticket sales go down.) (Point to the dots going down and the prices going up to help students see this.) Ask students if they think this data is related in the same way as the At the Beach data was related. (no) (You may have to show them the At the Beach transparency again and review what happens to ice cream sales as the temperature goes up.) Why are the two scatterplots different? (In At the Beach both sets of data increased, but in this graph, one set of data increases and the other decreases. The two sets of data are related but in a different way. They will learn later that Theater Ticket Sales is an example of negative correlation.)
- Put up the Our Class transparency. Ask students what kind of graph this is. (scatterplot) How do they know? (uses dots) What is this graph about? (students' heights and math test scores) What do they notice about this graph that is different from the previous two that they studied? (Put up transparencies of At the Beach and Theater Ticket Sales.) (The dots are not in a line.) Ask students if they think the data in this graph is related. (no) Why or why not? (The data is not in a straight line. As heights increase, test scores do not increase; nor do scores decrease as heights increase. The tallest student in the class does not have the highest grade, nor does the shortest student have the lowest grade or vice versa.) Review with students the fact that data can be

related or not related at all. i.e., At the Beach - related, Theater Ticket Sales - related, Our Class - not related.

2. Interpret a scatter plot.

- Pass out the Do Taller People Wear Bigger Shoes? activity sheet.
- Have students work individually or with a partner.
- Go over answers as a class.

3. Construct a scatter plot.

- Pass out How Many Baskets Did Linh Make? activity sheet.
- Have students work individually or in pairs to construct the appropriate scatter plot.
- Ask them to write a sentence about whether or not the data is related. (It is.)

4. Extension Activity

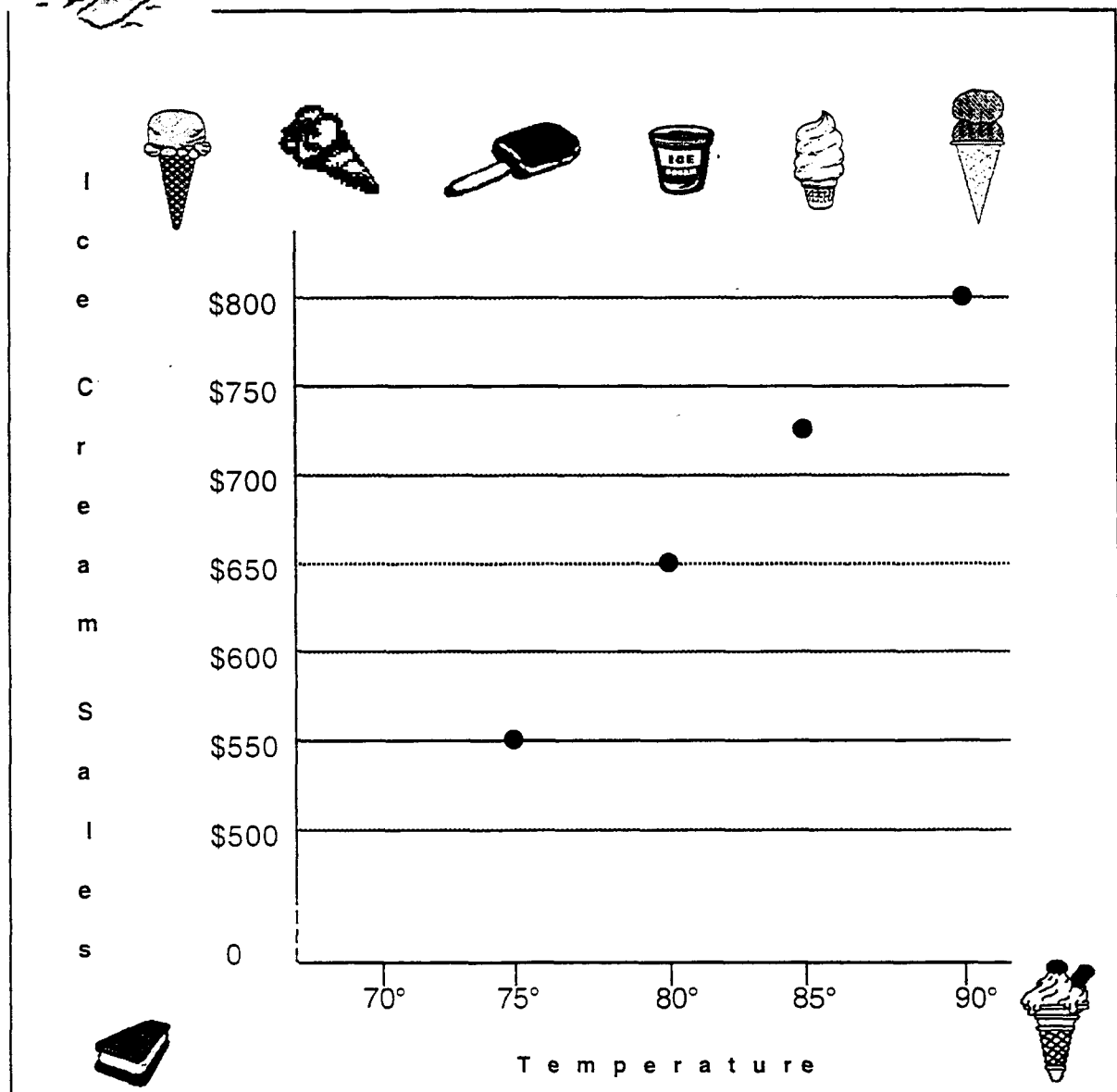
- Give students tape measures and have them measure their head circumferences (distance around their heads) and the length of their arms. (from their shoulders) Put the measurements for each student on the board. Tell students they will use this data to make a scatterplot. Ask them to decide from their scatterplots if there is a relationship between head circumference and arm length.
- Students may work on their own, with a partner, or in small groups. Review with students what their scatterplots will need. (axes, labels, interval, scale, title)

**Note:** (Generally there is a positive correlation between these two measurements. In other words as head circumference increases, arm length also increases. Depending on your class, there may or may not be a big difference in measurements. Some classes may see no correlation.)

Henry sold ice cream at the beach during the month of July. Look at the scatterplot below to see how much he sold. What do you notice about the data?

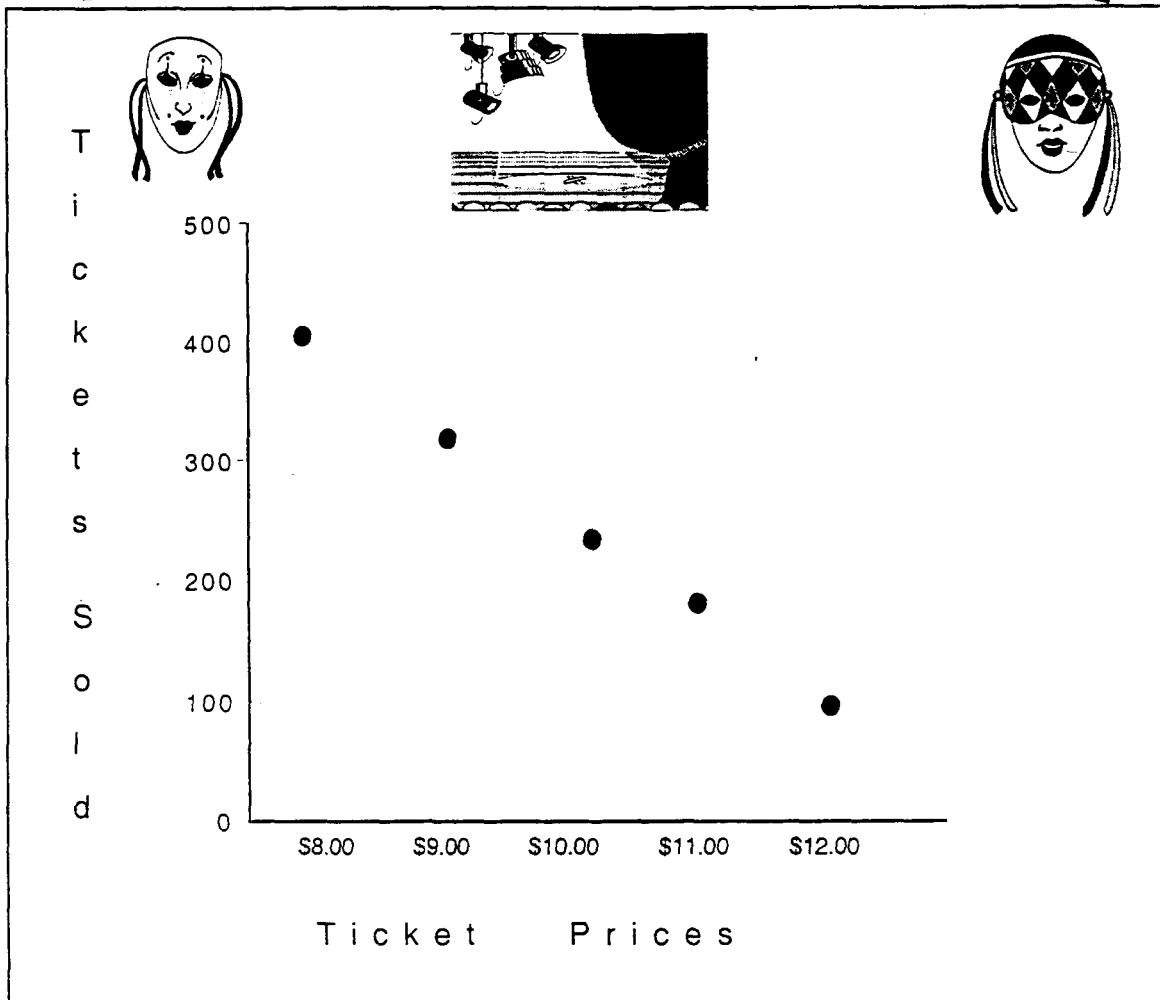


## AT THE BEACH

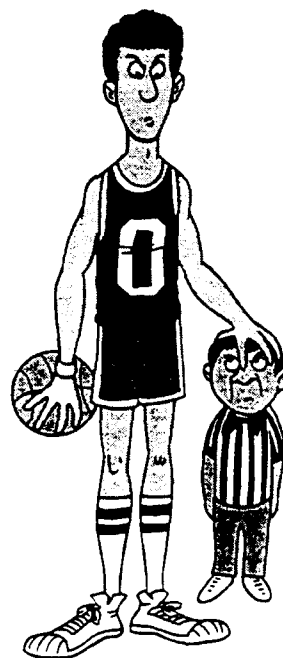
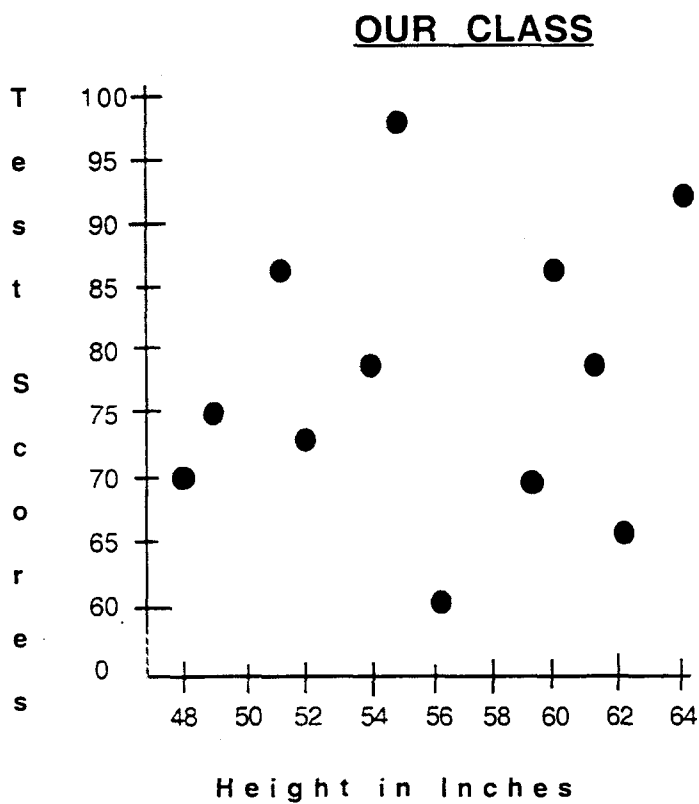




## Theater Ticket Sales



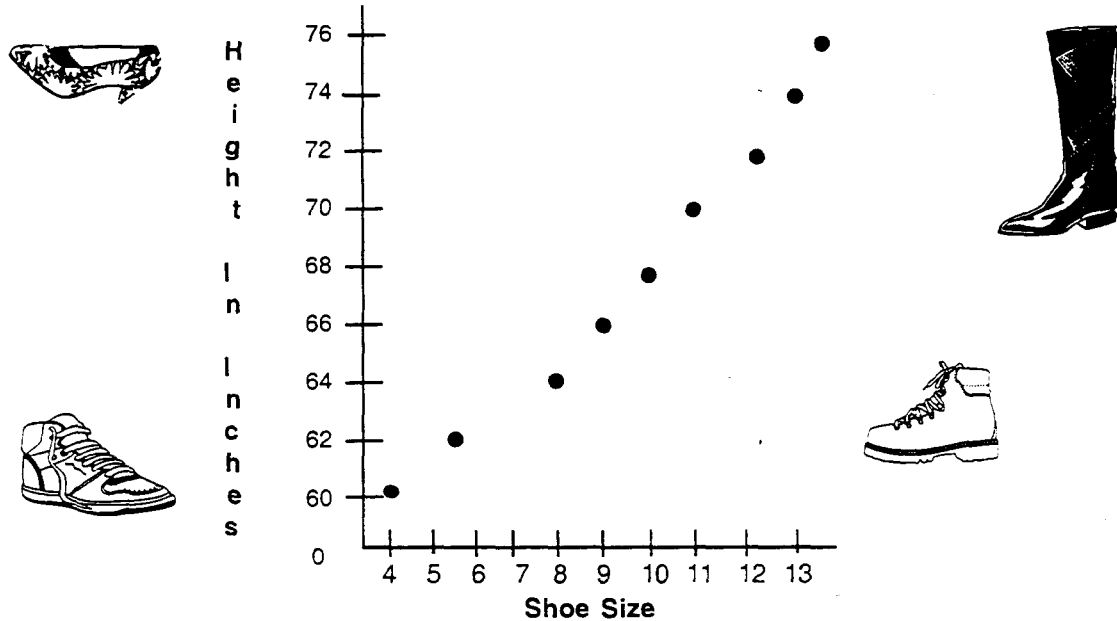
The seventh graders in Mrs. Chin's class made the scatterplot below using their heights and math test scores.





Name \_\_\_\_\_

### Do Taller People Wear Bigger Shoes?



1. What is this graph about? \_\_\_\_\_
2. What is the label on the vertical axis? \_\_\_\_\_
3. What is the interval on the vertical axis? \_\_\_\_\_
4. What is the label on the horizontal axis? \_\_\_\_\_
5. How tall is the person who wears a size 13 shoe? \_\_\_\_\_
6. What size shoe does the 64" tall person wear? \_\_\_\_\_
7. How tall is the person who wears a size 11 shoe? \_\_\_\_\_
8. How tall is the person who wears a size 9 shoe? \_\_\_\_\_
9. What size shoe does the 62" tall person wear? \_\_\_\_\_
10. Do you think this data is related? \_\_\_\_\_
11. Explain your answer to #10. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

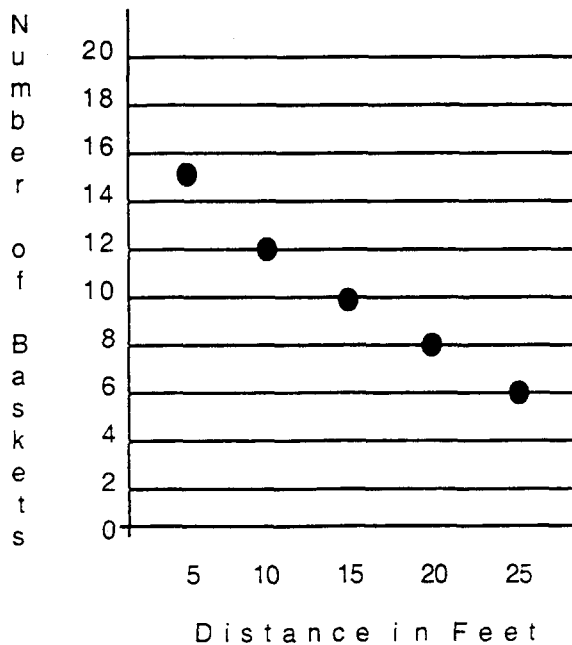
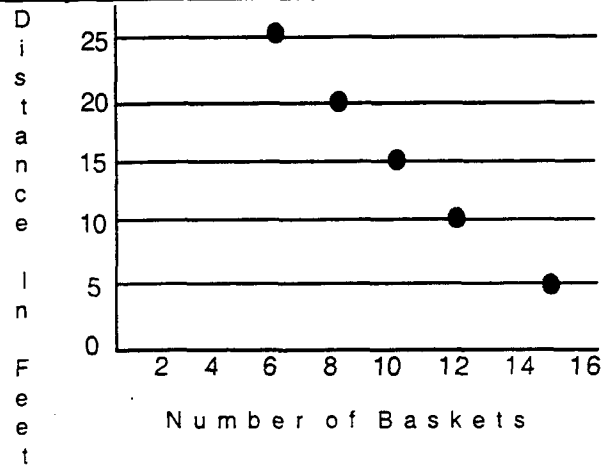


## Answer Key Obj. 4

### Do Taller People Wear Bigger Shoes?

- |  |  |
|--|--|
| <ol style="list-style-type: none"> <li>1. People's heights and their shoe size</li> <li>2. Height in inches</li> <li>3. 2</li> <li>4. Shoe Size</li> <li>5. 74"</li> </ol> | <ol style="list-style-type: none"> <li>6. 8</li> <li>7. 70"</li> <li>8. 66"</li> <li>9. 5 1/2</li> <li>10. Yes</li> <li>11. The data is related because the taller the person, the bigger the shoe.</li> </ol> |
|--|--|

### How Many Baskets Did Linh Make?



## Objective 5: Collect, organize, display, and interpret data using tables, charts, and line graphs with scale increments of one or greater than one.

### Vocabulary

table  
average  
line graph  
multiple line graph  
double line graph

### Materials

graph paper  
rulers  
colored pencils  
calculators

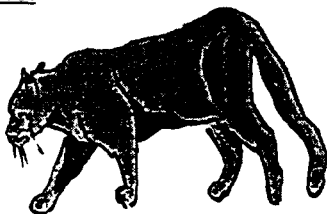
Transparencies:

Plotting Points  
Graph Paper  
Jaguars and Panthers

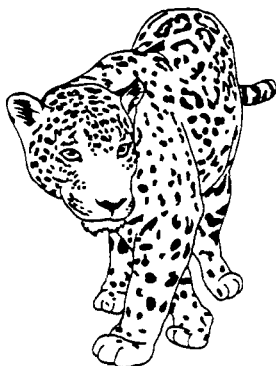
Student Copies:

Average Monthly Temperature -  
Washington, D.C  
Mrs. Clark's Readers  
Sneakers  
Jaguars and Panthers  
Lunch Time  
Choose Two!

panther

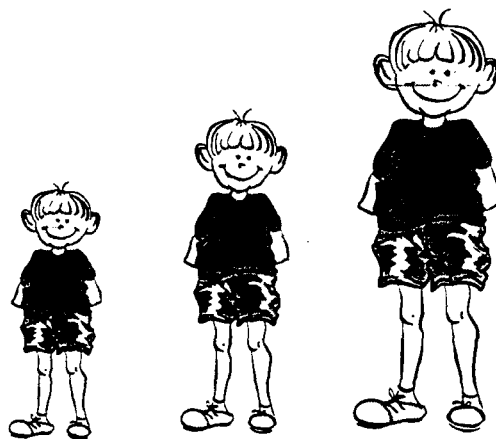


jaguar



### Language Foundation

1. In this lesson students will learn that a **table** is a chart that gives us information. Some students may know a table as a piece of furniture with four legs. Explain to students (if you haven't already done so) that many words in English have more than one meaning.
2. When doing the Jaguars and Panthers activity sheet, you can explain to the students that many sports teams in America are named after animals. If time allows, maybe students could tell the class if the same is true in their countries.
3. In some countries lunch is almost always eaten hot. Explain to students that a cold lunch is food that does not have to be cooked, like a sandwich. A hot lunch is food that has to be cooked and is usually eaten when it is warm.
4. To give students a general meaning of the word **average**, without going into statistical detail, stress to students that average means middle. i.e., 51, 52, 53 - 52 is the middle or average



average height

## Mathematics Component

### 1. Review plotting points.

- Put up the Plotting Points transparency. Tell students they will be plotting points as part of today's lesson on line graphs. Do the two exercises with the students. Students may need to be reminded to plot the x-axis first, then the y-axis.

### 2. Introduce line graphs.

- Cut out Average Monthly Temperature-Washington, D.C. strips and pass one out to each student. Tell students this is called a **table**. A table is a chart that gives us information. Ask students to look at the table. What does the table tell us? (average monthly temperature in Washington) Remind students that average temperature means the middle temperature.

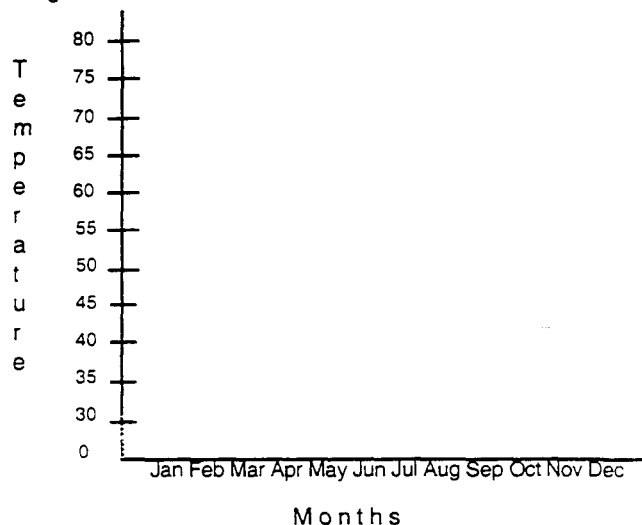
Average Monthly Temperature  
Washington, D.C.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec.
Temp.	30°	34°	42°	55°	62°	70°	76°	75°	67°	55°	45°	35°

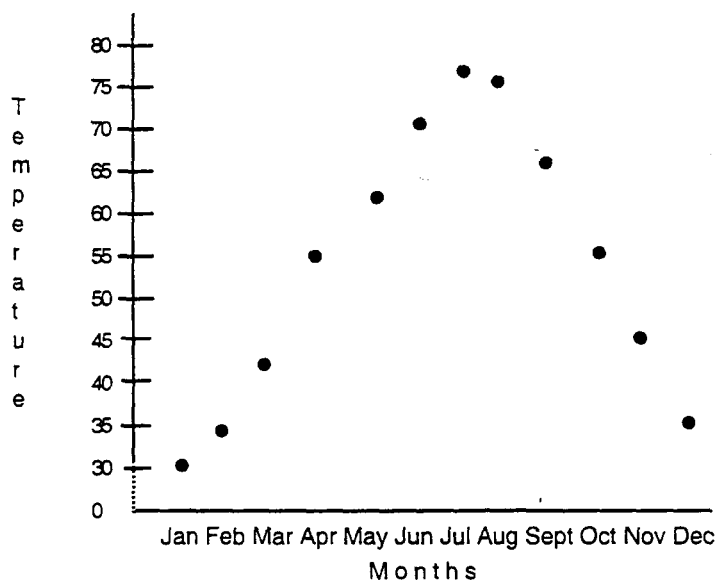
- Ask students a few questions to familiarize them with the table. i.e., What is the coldest month in Washington? (Jan.) What is the hottest month in Washington? (July) Do any months have the same average temperature? (April and October) What is the average temperature in May? (62°)
- Put up the Graph Paper transparency. Give students graph paper. Tell students they are going to make a new kind of graph using the information from the table. This graph is called a **line graph**.
- Draw two axes on the Graph Paper transparency. (vertical and horizontal) Have students do the same. Ask students what label they should give to the vertical axis. (Temperature) Label the horizontal axis Months. Ask students what a good

interval would be for the vertical axis. (5)

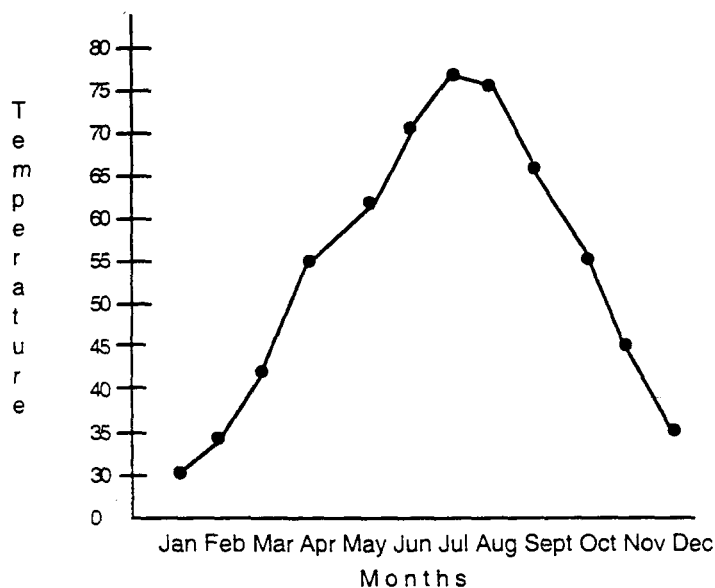
Remind students about the broken line on the scale (0 - 30) and what it means. (not a true interval) Write the months underneath the horizontal axis. (Students can abbreviate just as in the table.) (See diagram to the right.)



- Have a student come up to the overhead and find the first temperature (30°) on the vertical axis. Tell them to plot the point so that it is over the word January. If students have trouble plotting points for temperatures not ending in 0 or 5, show them how to approximate the point.



- Continue with students coming up to the overhead and plotting the points. (The rest of the class should be doing this on their graph paper at their desks.)
- When students are done plotting the points, ask students if they remember what kind of graph they are making. (line graph) Tell students in order to finish the graph and make it into a line graph, all the points on the graph need to be connected with lines. Put your overhead marker on the point for January and use a ruler to connect the January and February points. Continue connecting the rest of the points until 11 lines have been drawn. (See diagram below.) Have students do the same on their graphs.



3. Interpret a line graph.

- Ask students questions about the graph.
  - What happened to the temperature between January and February? (It increased.)
  - By how much? (4°)
  - In what other months did the temperature increase from the month before?  
(March, April, May, June, July)
  - Between which two months did the temperature increase the most? (March - April +13°)
  - What happened to the temperature between December and January? (It decreased.)
  - In what other months did the temperature decrease from the month before?  
(August, September, October, November)
  - What was the difference in temperature between the hottest month and the coldest month?  
(46° July 76° - January 30°)
  - What were the three coldest months? (December, January, February)
- Remind students again that this graph is called a line graph because it uses lines. Review with them that a bar graph uses bars, a pictograph uses pictures, and a scatter plot uses dots. Ask students what kind of data they think a line graph would be best for. (data that changes over time) Tell them that line graphs usually have one axis that is a time period i.e., hours, days, weeks, months, years. Ask them if this is true of our temperature graph. (yes) Which axis shows a time period? (horizontal) Which time period is represented by the horizontal axis? (months)

4. Practice with a line graph.

- Pass out Mrs. Clark's Readers.
- Work on the sheet together as a class. Have students use calculators if necessary.
- Pass out the Sneakers activity sheet for additional practice.

5. Introduce multiple or double line graphs.

- Put up the Jaguars and Panthers transparency. Let students look at it for a minute.
- Tell students this is called a **multiple line graph** or a **double line graph**. Why? Review with them what multiple and double mean. (multiple - more than one, double - two)
- Ask students what this graph is about. (two basketball teams and their scores)
- Point out the key box. Show students that the Cougars are represented by a solid line and the Panthers by a dotted line. Put two fingers on the graph to show the scores both teams had in game one. Do the same for the rest of the games.
- Pass out the Jaguars and Panthers activity sheet.
- Have students complete the activity sheet on their own or with a partner.
- For extra practice, have students do the Lunch Time activity sheet.

6. Construct a double line graph.

- Pass out the Choose Two! activity sheets.
- Have students select two cities (or you assign them) and construct a double line graph.
- Go over directions with students. Read “Remember To:” steps.



## PLOTING POINTS

Find the coordinates of the points.

A \_\_\_\_\_

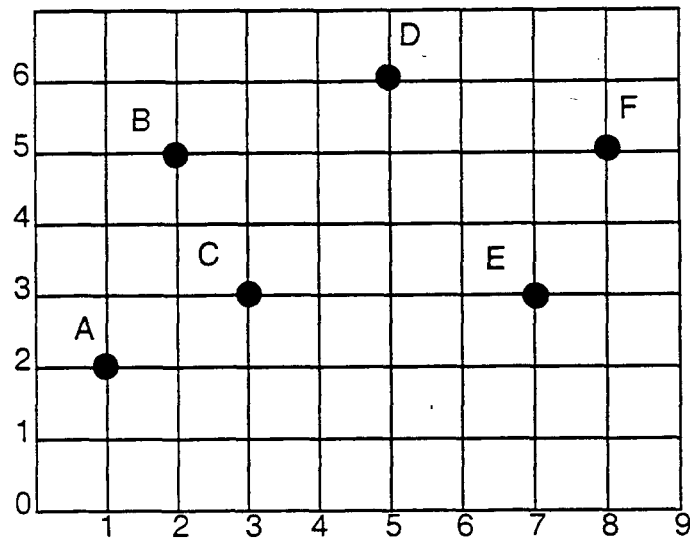
B \_\_\_\_\_

C \_\_\_\_\_

D \_\_\_\_\_

E \_\_\_\_\_

F \_\_\_\_\_



Plot the following points in order and connect them with lines to make a picture.

A 4,6

B 2,4

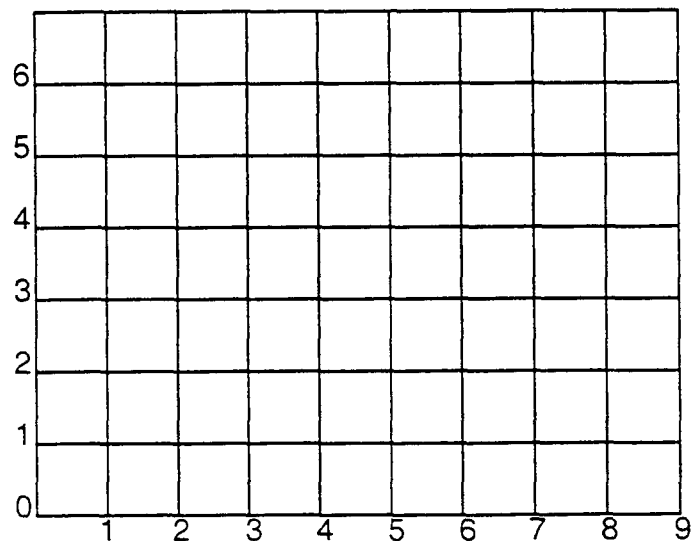
C 3,4

D 3,2

E 5,2

F 5,4

G 6,4



Cut out strips below.

Average Monthly Temperature  
Washington, D.C.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec.
Temp.	30°	34°	42°	55°	62°	70°	76°	75°	67°	55°	45°	35°

---

Average Monthly Temperature  
Washington, D.C.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec.
Temp.	30°	34°	42°	55°	62°	70°	76°	75°	67°	55°	45°	35°

---

Average Monthly Temperature  
Washington, D.C.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec.
Temp.	30°	34°	42°	55°	62°	70°	76°	75°	67°	55°	45°	35°

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Average Monthly Temperature  
Washington, D.C.

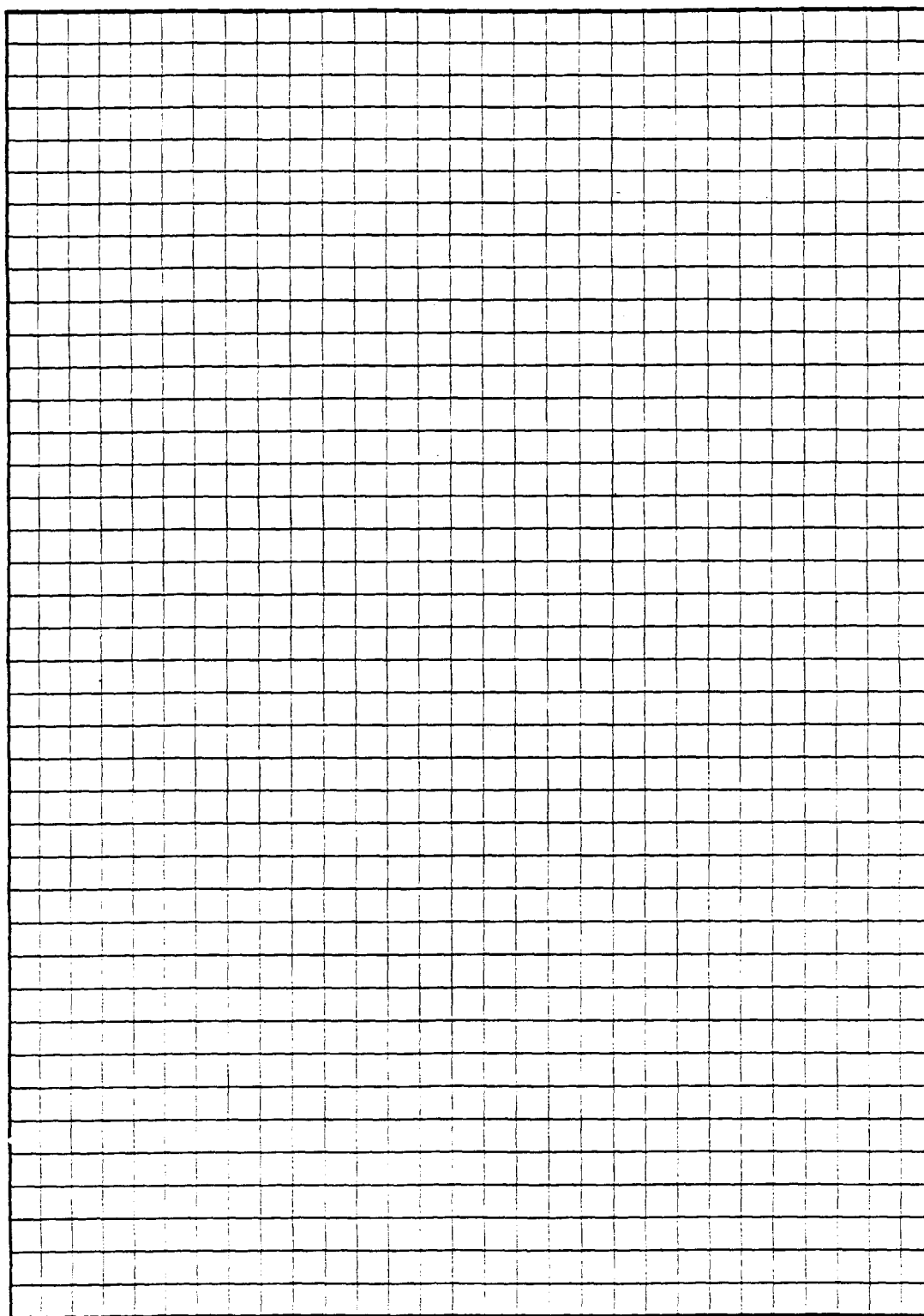
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec.
Temp.	30°	34°	42°	55°	62°	70°	76°	75°	67°	55°	45°	35°

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Average Monthly Temperature  
Washington, D.C.

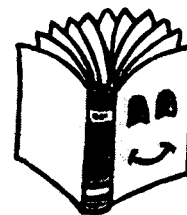
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec.
Temp.	30°	34°	42°	55°	62°	70°	76°	75°	67°	55°	45°	35°

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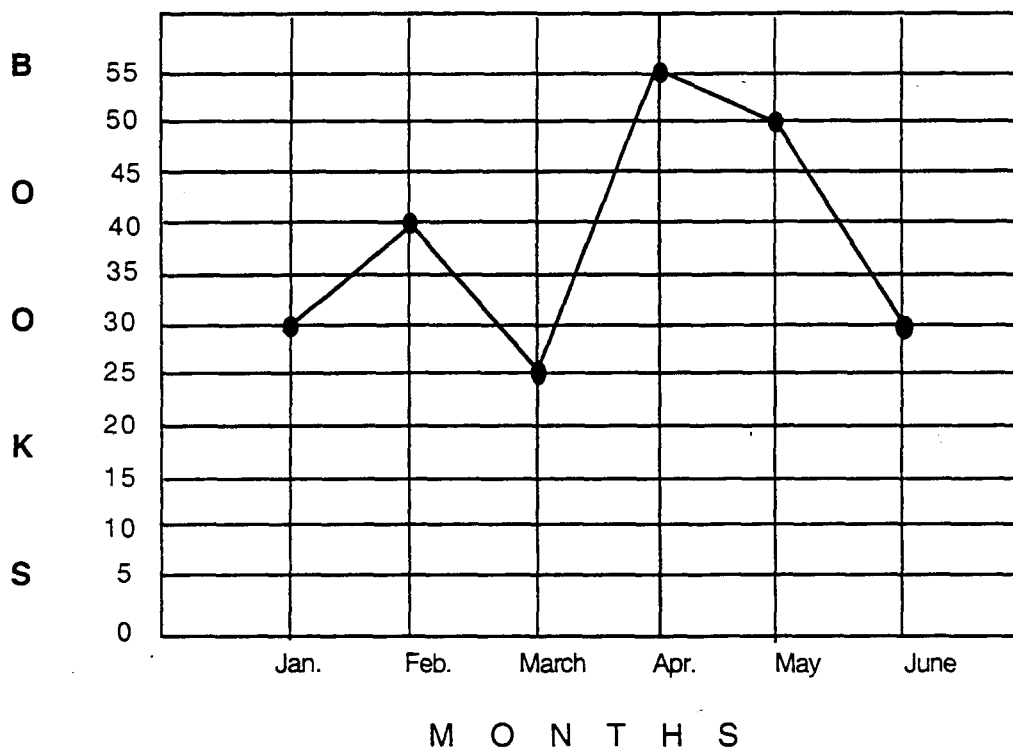


Name \_\_\_\_\_

MRS. CLARK'S READERS



The ESL students in Mrs. Clark's class decided to count how many books they could read from January to June. Look at the line graph below and answer the questions.



1. How many total books did the students read in six months? \_\_\_\_\_
2. What was the most number of books read in one month? \_\_\_\_\_
3. In what months did the students read more than 35 books? \_\_\_\_\_  
\_\_\_\_\_
4. In which month did the students read the most books? \_\_\_\_\_
5. In which month did the students read the least number of books? \_\_\_\_\_
6. How many books did the students read in May? \_\_\_\_\_
7. Between which two months did the number of books read increase the most? \_\_\_\_\_  
\_\_\_\_\_
8. Between which two months did the number of books read decrease the most? \_\_\_\_\_  
\_\_\_\_\_
9. If there were 23 students and each read the same number of books, how many books did each student read? \_\_\_\_\_

Name \_\_\_\_\_

Look at the table to see how many sneakers the Lee Shoe Store sold last week. Make a line graph from the data.

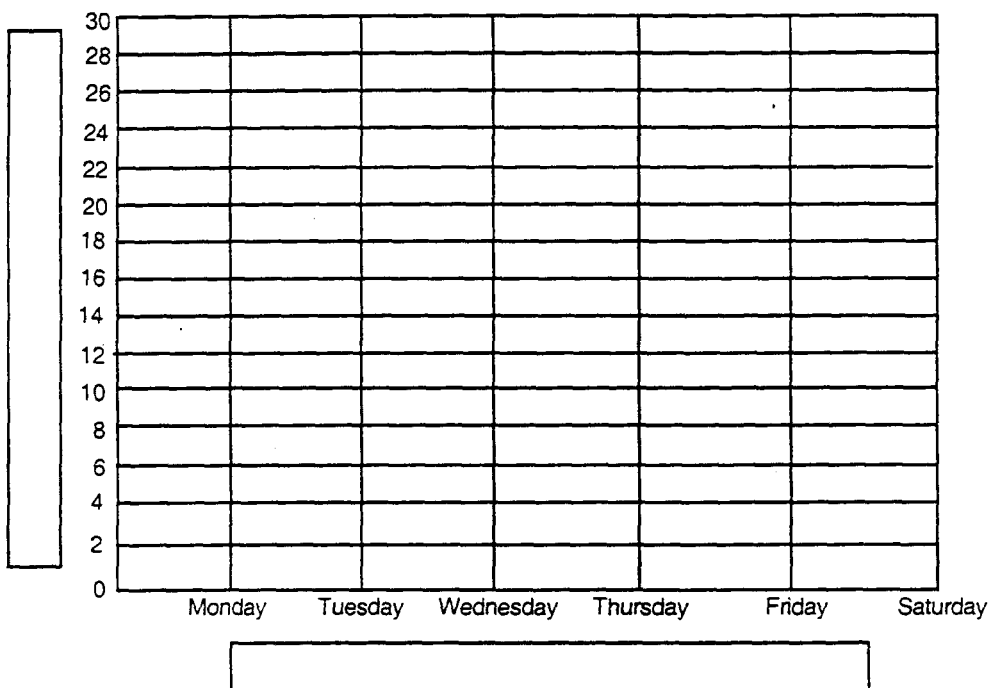


Follow these steps.

1. Use the table to find the sales for Monday.
2. Find Monday on the bottom of the graph.
3. Go up the Monday line to 16.
4. Put a point on the graph.
5. Do the same for the other five days of the week.
6. Use a ruler and connect the points.
7. Give the graph a title and labels.

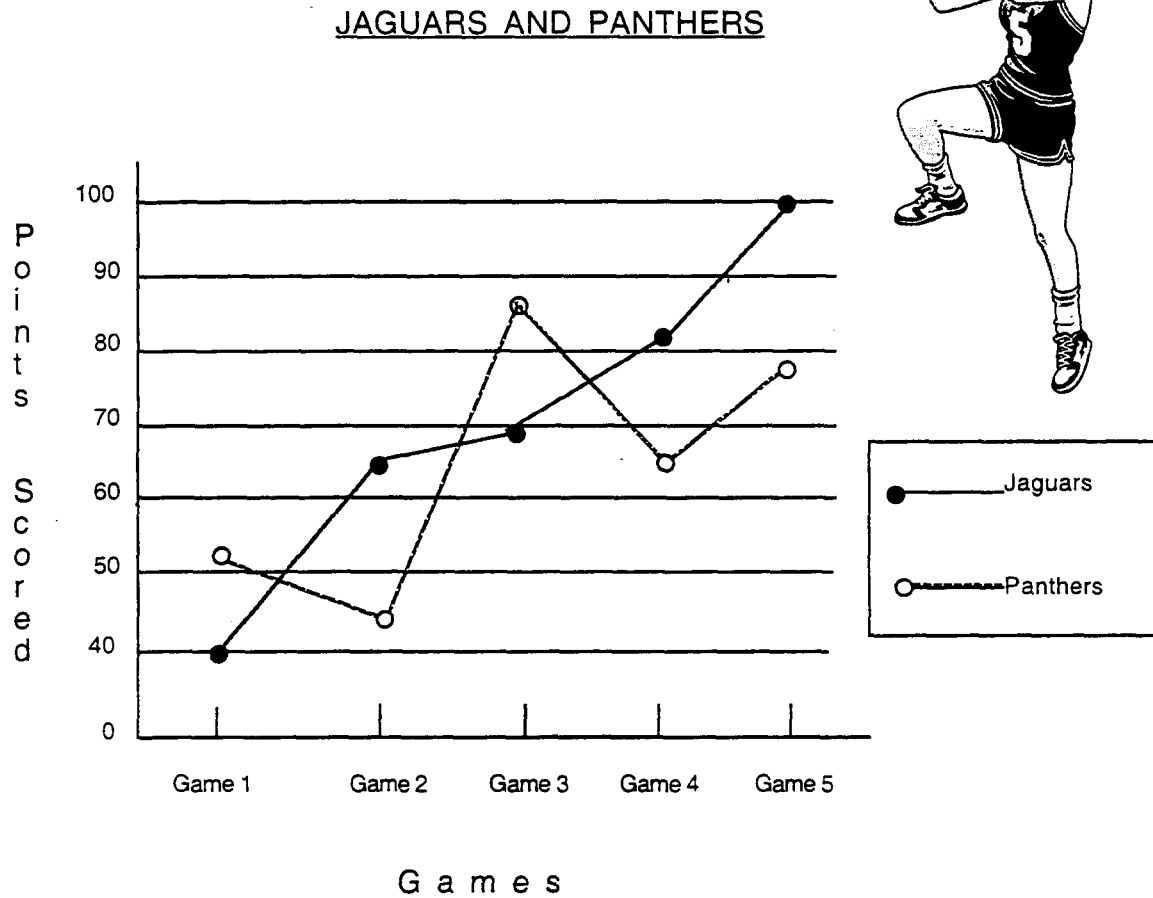
Sales for One Week

Day	Number of Sales
Monday	16
Tuesday	18
Wednesday	12
Thursday	14
Friday	28
Saturday	26



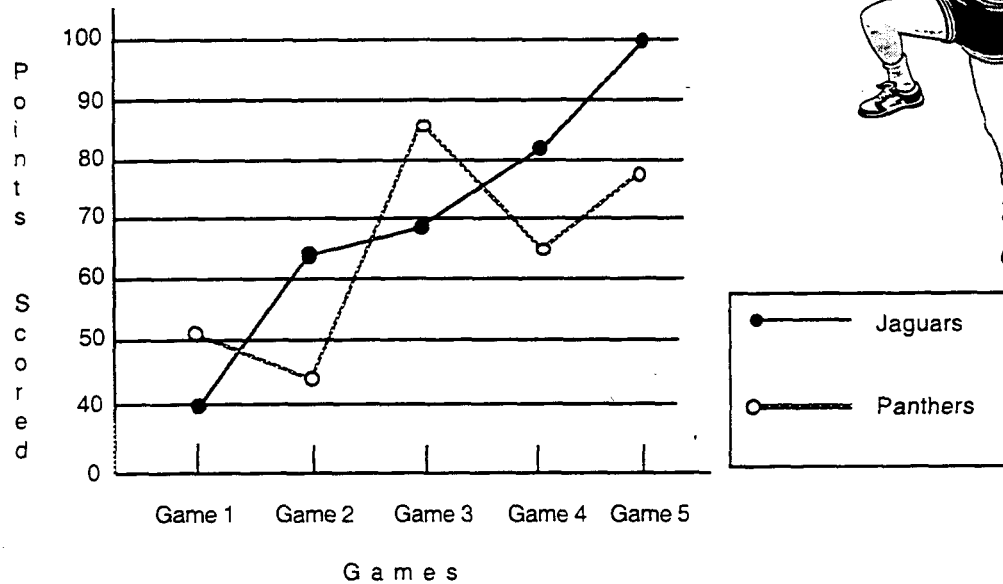
1. What is this graph about? \_\_\_\_\_
2. Which day had the greatest sales? \_\_\_\_\_
3. Which day had the least sales? \_\_\_\_\_
4. How many sales were there on Monday? \_\_\_\_\_ Tuesday? \_\_\_\_\_ Friday? \_\_\_\_\_
5. Between which two days did sales increase the most? \_\_\_\_\_
6. On which two days did sales decrease from the day before? \_\_\_\_\_

The Jaguars and the Panthers played five games against each other last year. Look at the line graph below to see how many points each team scored.



Name \_\_\_\_\_

# JAGUARS AND PANTHERS

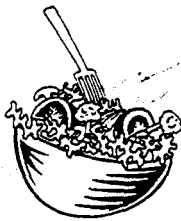
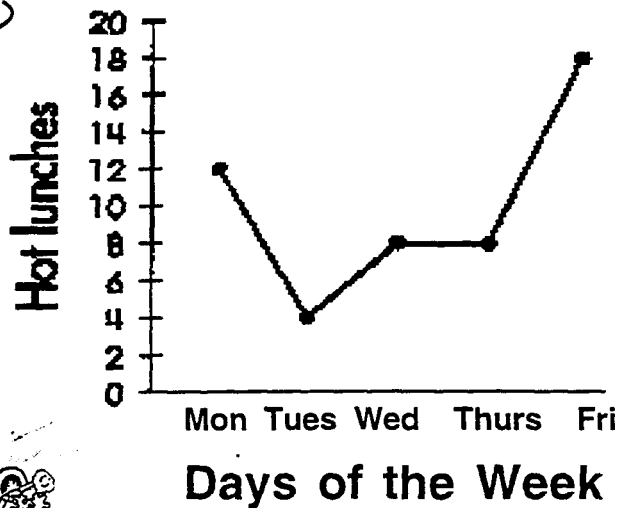


1. What is this graph about? \_\_\_\_\_
2. How many games did the Jaguars win? \_\_\_\_\_
3. How many games did the Panthers win? \_\_\_\_\_
4. What was the score in game 1? Jaguars \_\_\_\_\_ Panthers \_\_\_\_\_
5. What was the score in game 2? Jaguars \_\_\_\_\_ Panthers \_\_\_\_\_
6. Which team scored the highest total number of points? \_\_\_\_\_
7. What was the highest number of points the Panthers scored? \_\_\_\_\_
8. What was the highest number of points the Jaguars scored? \_\_\_\_\_
9. What was the lowest number of points the Panthers scored? \_\_\_\_\_
10. What was the lowest number of points the Jaguars scored? \_\_\_\_\_
11. What was the difference in points between the Jaguars' first game and their last game? \_\_\_\_\_
12. What was the difference in points between the Panthers' first game and their last game? \_\_\_\_\_

Name \_\_\_\_\_



## Lunch Time



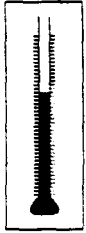
- How many students ate a hot lunch on Monday? \_\_\_\_\_
- On Friday, did more or less students eat a hot lunch than on Monday? \_\_\_\_\_
- Why do you think the line dropped down on Tuesday? \_\_\_\_\_
- Why do you think the line went up on Friday? \_\_\_\_\_
- The class had 20 students. The students who did not eat hot lunch ate cold lunch. On Monday, 12 students ate a hot lunch. How many ate a cold lunch? \_\_\_\_\_
- How many cold lunches were eaten each day for the rest of the week?  
Tues. \_\_\_\_\_ Wed. \_\_\_\_\_ Thurs. \_\_\_\_\_ Fri. \_\_\_\_\_
- Get a colored pencil and draw dots on the same graph for the cold lunches. (Look at question #5 and #6.) Connect the dots.
- Write two sentences about the colored graph.



Name \_\_\_\_\_

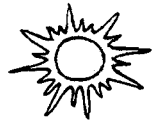
## Choose Two!

Choose two cities from the table below and use the data to make a double line graph. Be sure to title and label your graph. Use a different color pencil for each city.



### AVERAGE TEMPERATURE

<u>City</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sept</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
Boston	30	31	38	49	59	68	74	72	65	55	45	34
Chicago	21	26	36	49	59	69	73	72	65	54	40	28
Honolulu	73	73	74	76	78	79	80	81	81	80	77	74
Houston	51	55	61	69	75	81	83	83	78	70	60	54
Juneau	22	28	31	39	46	53	56	55	49	42	33	27
L.A.	57	59	60	62	65	69	74	75	73	69	63	58
Miami	67	68	72	75	79	81	83	83	82	78	73	69
New York	32	33	41	53	62	71	77	75	68	58	47	36
Washington	31	34	42	53	62	71	76	74	67	55	45	35

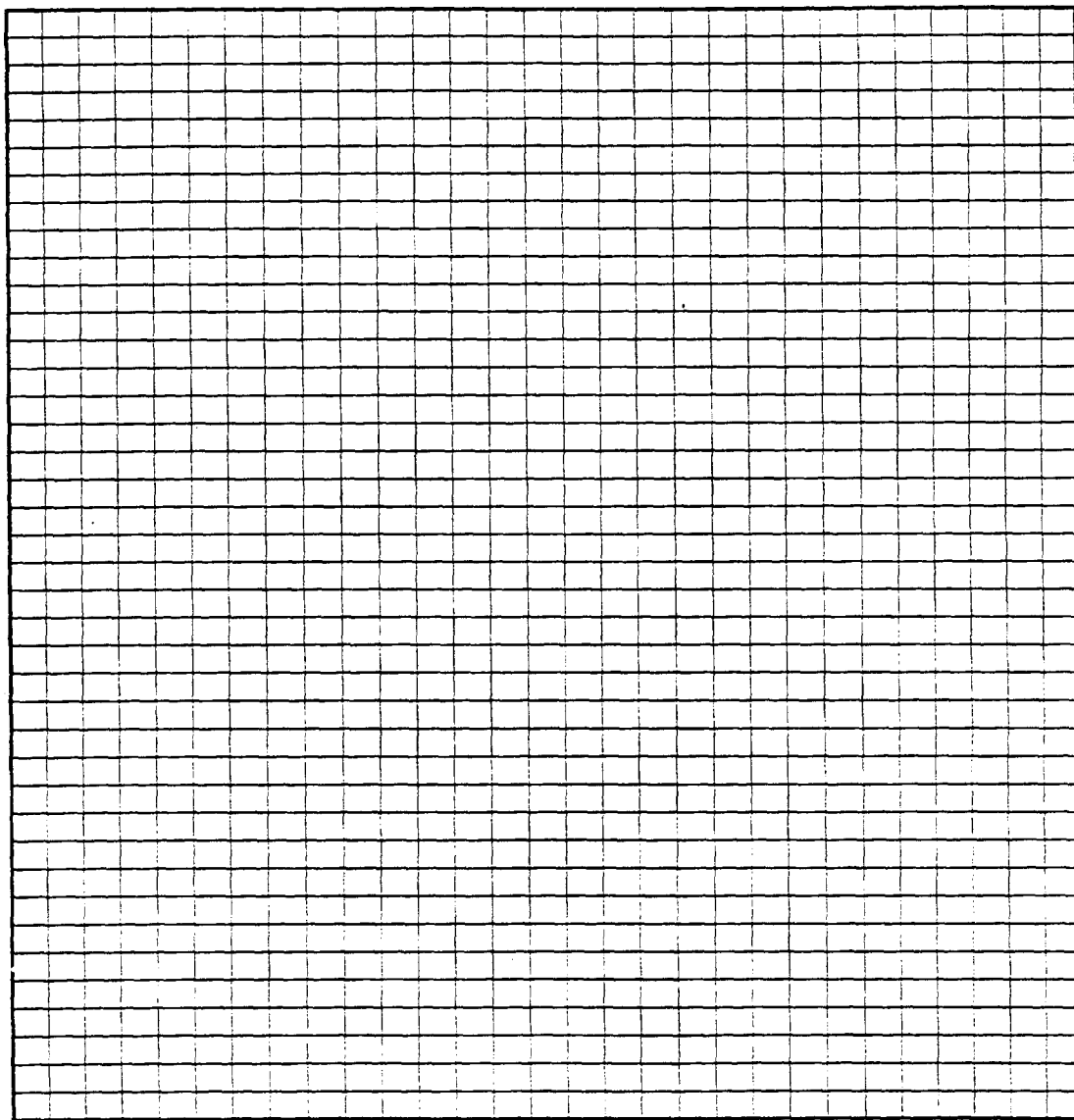


Write five sentences about the temperatures of your two cities.

1. \_\_\_\_\_  
\_\_\_\_\_
2. \_\_\_\_\_  
\_\_\_\_\_
3. \_\_\_\_\_  
\_\_\_\_\_
4. \_\_\_\_\_  
\_\_\_\_\_
5. \_\_\_\_\_  
\_\_\_\_\_

Remember to:

- 1) Title your graph.
- 2) Label your graph.
- 3) Use a different color pencil for each city.
- 4) Plot your points.
- 5) Use your ruler to connect the points.
- 6) Make a key.



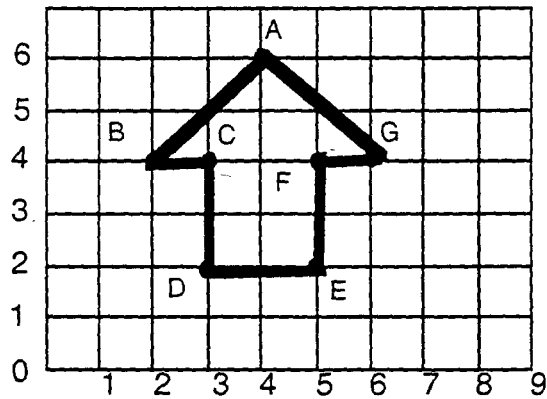
## Answer Key Obj. 5

### Plotting Points p. 6

- A 1,2
- B 2,5
- C 3,3
- D 5,6
- E 7,3
- F 8,5

Plot the following points and connect them with lines to make a picture.

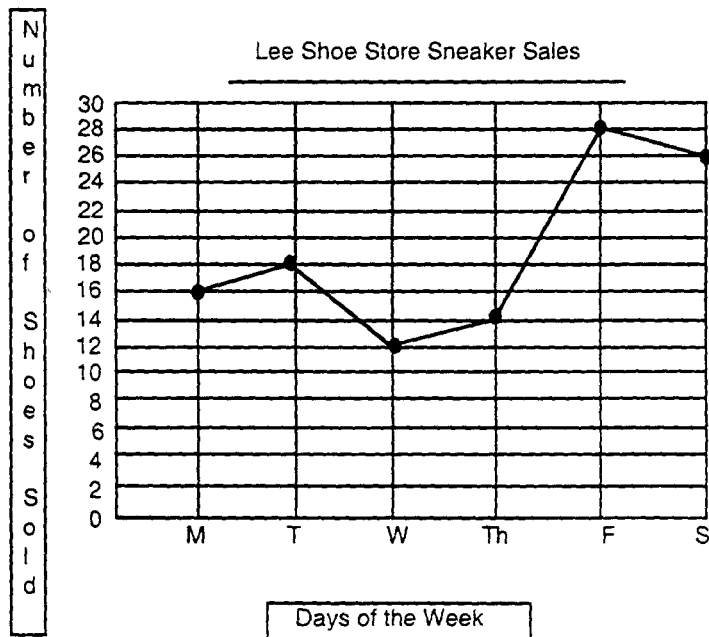
- A 4,6
- B 2,4
- C 3,4
- D 3,2
- E 5,2
- F 5,4
- G 6,4



### Mrs. Clark's Readers p. 9

1. 230 books
2. 55 in April
3. February, April and May
4. April
5. March
6. 50 books
7. March - April
8. May - June
9. 10 books

### Sneakers p. 10



1. Sneaker sales at the Lee Shoe Store
2. Friday
3. Wednesday
4. Monday - 16, Tuesday - 18, Friday - 28
5. Thursday to Friday
6. Wednesday and Saturday

**Jaguars and Panthers p. 12**

1. 5 basketball games between the Jaguars and the Panthers
2. 3 games
3. 2 games
4. Jaguars 51, Panthers 40 (Accept reasonable answers.)
5. Jaguars 65, Panthers 43 (Accept reasonable answers.)
6. Jaguars
7. 85 (Accept reasonable answers.)
8. 100 (Accept reasonable answers.)
9. 43 (Accept reasonable answers.)
10. 40 (Accept reasonable answers.)
11. 60 points (Accept reasonable answers.)
12. 27 points (Accept reasonable answers.)

**Lunch Time p. 13**

1. 12
2. more
3. Answers will vary. Possible answers - no one liked what was being served, students brought lunch from home or a lot of students who usually eat hot lunch were absent that day.
4. Answers will vary. Possible answers - a popular lunch was being served, a lot of students wanted hot lunch that day, no one had sandwich fixings at home.
5. 8 students
6. Tues - 16, Wed - 12, Thurs - 12, Fri - 2



**Objective 6: Collect, analyze, display, and interpret data using circle graphs. Circle graphs will be limited to halves, fourths, and eighths.**

**Vocabulary**

circle graph  
pie graph

**Materials**

rulers  
colored pencils

Transparencies:

Circles  
Pie  
Rita's Job  
At the Pet Store

Student Copies:

Circles Activity Sheet  
Rita's Job  
Tutti-Fruiti  
Hours in a Day Graph

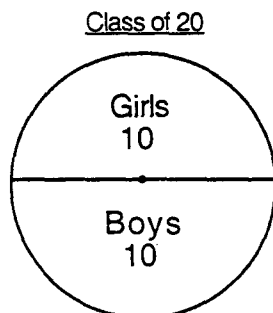
**Language Foundation**

1. Students will be learning the term **circle graph** in this lesson. They should know that it is also called a **pie graph**.
2. Explain to students that a **pie** is something Americans eat after dinner. Pies are usually made with fruit. There are all kinds of different pies i.e., apple, cherry, pumpkin. Pizza can also be called a pie i.e., pizza pie. Basically, pies are circular and can be divided in sections or slices.
3. The word **activity** may be new for some students. Explain that an activity is something that a person does. In class examples of activities are writing, reading, drawing, making things, etc.

## Mathematics Component

### 1. Introduce Circle Graphs.

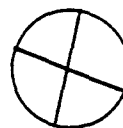
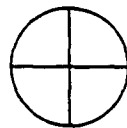
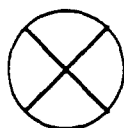
- Put up the Circles transparency. Ask students what shape these are. (circles) Point to the top circle and tell students that this circle represents a class of 20 students. Write Class of 20 above the circle. Draw a line across the middle of the circle. Ask students how many parts they see. (2) Tell them the class has been divided into two parts. What is each part called? (1/2) Write girls on one half and boys on the other. How many girls are there? (10) How many boys? (10) Write 10 on each half of the circle.



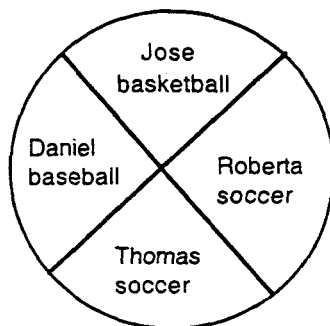
- Ask students if they think this is a graph. Students will most likely say no because they are used to graphs with axes. Lead them to the right answer by asking, "Is this a drawing that gives us information?" (yes) Tell students this kind of graph is called a **circle graph** or a **pie graph**. Tell them a circle graph uses parts of a circle to give information.
- Show students the Pie transparency. Ask them why a circle graph might also be called a pie graph. (It's round like a pie and can be divided into pieces.)
- Using the second circle on the Circles transparency, ask students if they know other ways a circle can be divided into two, besides horizontally across the middle. (vertically or diagonally) Let them come up to the overhead and show you. Make sure they use a ruler so the lines are straight. (All lines must go through the center.)

### 2. Create a Circle Graph.

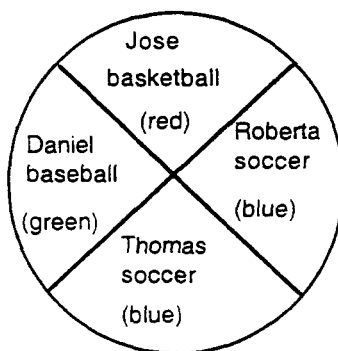
- Give students the Circles activity sheet.
- Ask students how a circle could be divided into four equal parts.
- On the sheet have students divide two circles into four equal parts. Tell them each circle should be divided in a different way. Ask them what each part of the circle is called. (1/4) Make sure they use rulers. Make sure all lines go through the center. (See possibilities below.)



- Erase the Circles transparency. Divide each of the two circles into four equal parts.
- Pick four students to come up to the front of the room. Tell the class that these four students are a group. Ask each student to write their name in one fourth of the first circle.
- Next, ask each of the four students what their favorite sport is. (or any other topic you want) Have them write their answer under their name. The rest of the class should be copying this information in their first circle on their activity sheets at their desks. Tell students that they have just made a circle graph. Ask students what title they could give to this graph. (favorite sports)



- Pick another group of four students and do the same thing again using a different topic. (favorite ice cream, favorite color, etc.) Have students use the second circle on their papers. (If your class is small, you may have to use the same students more than once.)
- For the last circle, tell students they are to make their own circle graph. Tell them they need to pick four classmates and ask them a question.
- If you want, students can color the same labeled parts with the same color. (i.e. soccer = blue, basketball = red, baseball = green, etc.) You may want to color the example on the board so students understand. Make sure students remember to title their circle graphs.



### 3. Interpret a circle graph.

- Put up the Rita's Job transparency. Read the problem aloud. Ask students how many parts the circle has? (8) How many hours a day does Rita work? (8) How many hours does each part of the circle represent? (1)